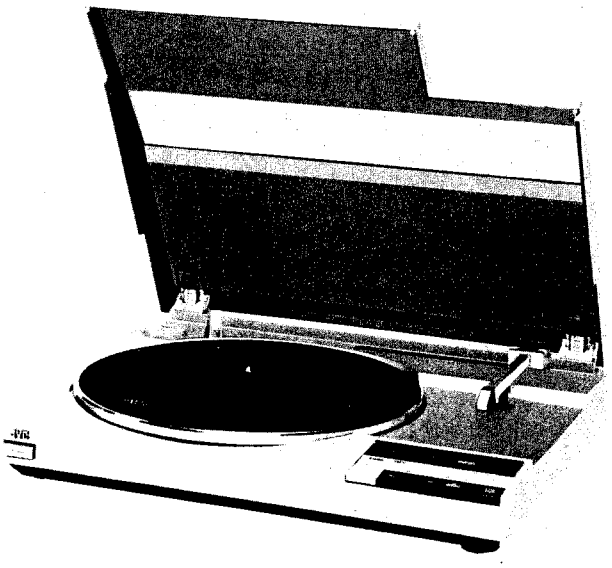
JVC

SERVICE MANUAL

MODEL QL-L2

LINEAR TRACKING FULLY AUTOMATIC TURNTABLE



No. 2659
MAR. 1983

Safety Precaution

1. The design of this product contains special hardware, many circuits and components specially for safety purposes.
   For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
2. Alterations of the design or circuitry of the product should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
3. Many electrical and mechanical parts in the product have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. Electrical components having such features are identified by shading on the schematics and by (⚠) on the parts list in Service manual. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in Service manual may create shock, fire, or other hazards.
4. The leads in the products are routed and dressed with ties, clamps, tubings, barriers and/or the like to be separated from live parts, high temperature parts, moving parts and/or sharp edges for the prevention of electric shock and fire hazard.
   When service is required, the original lead routing and dress should be observed, and they should be confirmed to be returned to normal, after re-assembling.
5. Leakage current check
   (Safety for electrical shock hazard)
   After re-assembling the product, always perform an isolation check on the exposed metal parts of the Products (antenna terminals, knobs, metal cabinet, screw heads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.
   Do not use a line isolation transformer during this check.
   - Plug the AC line cord directly into the AC outlet. Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5 mA AC (r.m.s.).
   - Alternate check method
     Plug the AC line cord directly into the AC outlet. Use an AC voltmeter having 1,000 ohms per volt or more sensitivity in the following manner. Connect a 1500 Ω 10 W resistor paralleled by a 0.15 μF AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.).
     Measure the AC voltage across the resistor with the AC voltmeter.
     Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75 V AC (r.m.s.). This corresponds to 0.5 mA AC (r.m.s.).

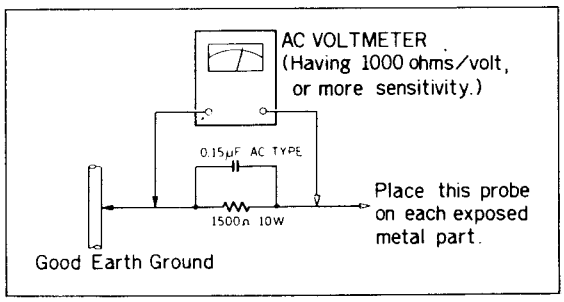
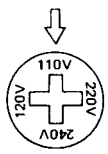


Fig. 1

CHECKING YOUR LINE VOLTAGE (For U.S. Military Market and Other Countries)
Before inserting the power plug, please check this setting to see that it corresponds with the line voltage in your area. If it doesn't, be sure to adjust the voltage selector switch to the proper setting before operating this equipment. The voltage selector switch is located underneath the platter on the cabinet.



CAUTION Before selecting the "Voltage selector switch" to proper voltage disconnect the power plug.

Features

- Linear tracking tonearm
- Fully automatic mechanism
- Plug-in MM cartridge
- Independent suspension system permits greater howling margin.

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1. Specifications

MOTOR SECTION

Motor	: Quartz-locked coreless DC servo-motor
Drive system	: Direct drive
Speeds	: 33-1/3, 45 rpm
Wow and flutter	: 0.025 % (WRMS)
Signal to noise ratio	: 78 dB (DIN-B)

TONEARM SECTION

Type	: Linear tracking statically balanced low-mass arm
Effective length	: 157 mm
Tracking error	: 25′

CARTRIDGE SECTION (Except for U.S.A.)

Model	: MD-1045
Type	: Low mass type, moving magnet (MM)
Frequency response	: 10 Hz – 25,000 Hz
Output	: 2.5 mV (1,000 Hz)
Channel separation	: 25 dB (1,000 Hz) (test record TRS-1)
Load resistance	: 47 kohms
Compliance	: 9 x 10^{-6} cm/dyne (Dynamic)
Stylus tip	: 0.6 mil diamond
Stylus	: DT-45
Optimum tracking force	: 1.25 g

GENERAL

Dimensions	: 97(H) x 435(W) x 360(D) mm
Net weight	: 5.1 kg (11.2 lbs)

Accessories

EP adapter 1
Cartridge fixing screw and screw-driver . . . . . 1 each (only for U.S.A.)

POWER SPECIFICATIONS

Countries	Line Voltage & Frequency	Power Consumption
U.S.A. & CANADA	AC 120 V, 60 Hz	15 watts
CONTINENTAL EUROPE	AC 220 V∿, 50 Hz	
U.K. & AUSTRALIA	AC 240 V∿, 50 Hz	
U.S. MILITARY MARKET & OTHER AREAS	AC 110/120/220/240 V∿ selectable, 50/60 Hz	

Design and specifications subject to change without notice.

2. Service Precautions

(1) When replacing parts marked ⚠ , be sure to use the specified parts to ensure safety.
(2) When removing the tonearm, motor, mechanism, etc., be sure to check or adjust the lead-in position.
(3) When servicing the motor for proper speed, be sure to install it level.
(4) Since the rotor of the motor uses magnets, be careful to avoid iron powder, etc. when servicing.
(5) The power cord is connected to the primary lead wires of the power transformer using a solderless connector. When this connector has to be replaced to replace the transformer, etc., be sure to check the new connector connection.
(6) The lubricants listed below are employed in the QL-L2; do not use other than those specified.

Name	Application place
Furoyl GP-501A / Furoyl GB-TS-1 (1:1 mix)	Engagement section between worm and worm gear Engagement section between both ends of worm ass'y and bearing stand Engagement section between pully (M) and shaft
Anderole 732	Mechanism base: Engagement section between roller and shaft Thrust sliding section between roller and mechanism base
GP-608	Pipe

(7) This unit has a construction in which the bottom board floats on springs away from the cabinet.
With this construction, the playback system including the cartridge, etc. is isolated from the effects of sound pressure, etc. on the cabinet and dust cover. This leads to a greatly improved howling margin.
After completion of repairs, be careful that the cabinet and the bottom board are not connected by shaping the wires correctly before joining them.

(8) Handling the flat card (very thin parallel wire)
For the above construction, this unit employs a flat card with low mechanical resistance to connect the board ass'ies on the cabinet and bottom board sides.
When handling this, pay attention to the following points:
1) Do not bend the terminal section too much.

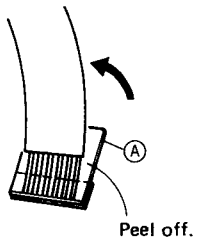


Fig. 2

2) When inserting into the socket.
a) Hold the wire section and section Ⓐ together.
b) Paying attention to the direction, insert it into the socket fully until it stops.

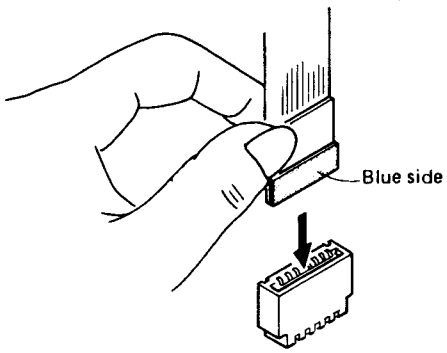


Fig. 3

3) When replacing the socket.
a) Do not apply a soldering iron for a long time.
b) Be careful the copper foil does not peel off the board.

3. Foot Ass'y and Installation Positions

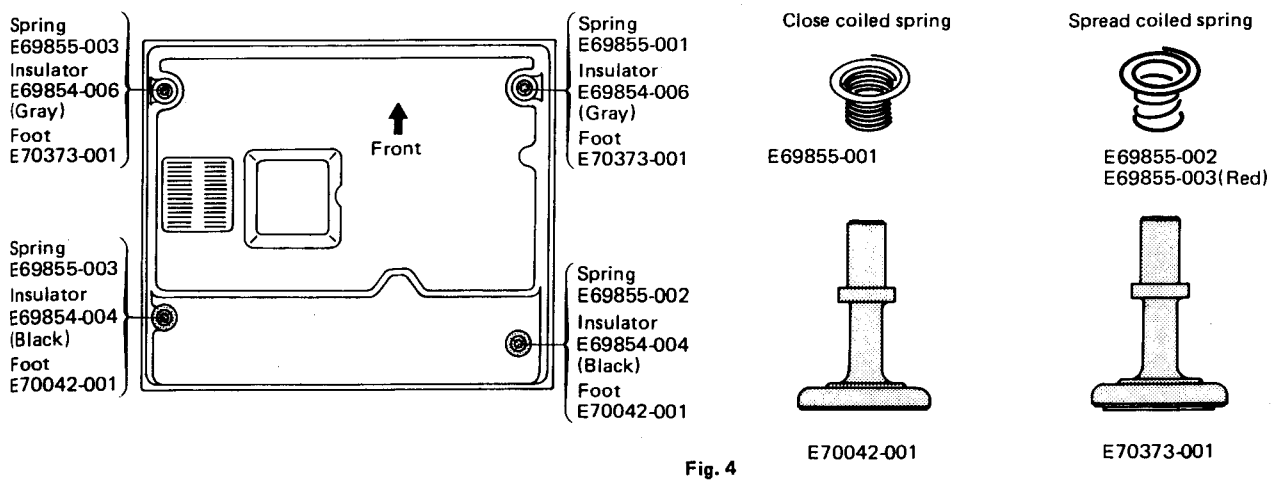


Fig. 4

4. Names of Parts and Their Functions

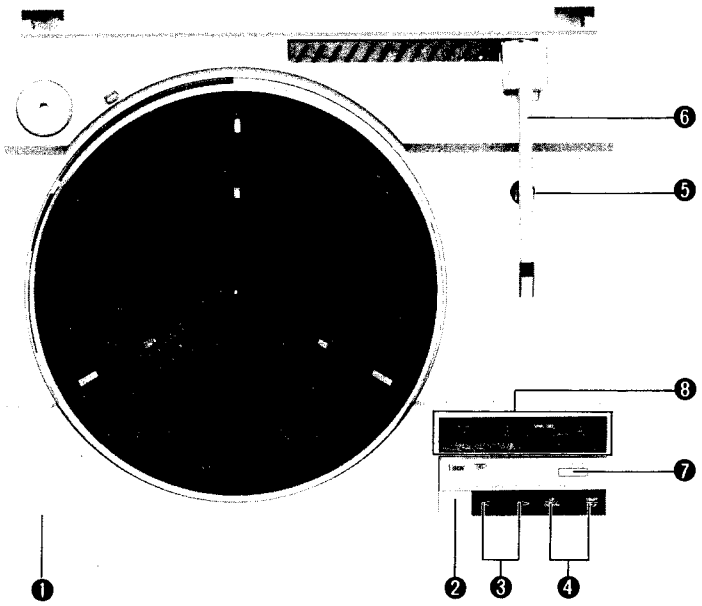


Fig. 5

❶ POWER switch

ON (⏤) : Press to set to this position to turn the power on; the indicators and the lamp for the size detection sensor will light.

STAND BY (⏏) : Press to set to this position to turn the power off.

Note:

Even when the POWER switch is off, this turntable consumes a small amount of electricity (2.5 watts). Disconnect the power cord to turn the electricity off completely.

❷ REPEAT button

Press this button to repeat a record. The REPEAT indicator will light. To release this function, press it again; the indicator will go out.

❸ Tonearm movement control (< , >)

< : Press this arrow to move the tonearm to the left, the tonearm stops when the button is released.

> : Press this arrow to move the tonearm to the right, the tonearm stops when the button is released.

❹ UP/DOWN & START/STOP button

UP/DOWN : Press this side to lift or lower the tonearm. Use this for manual operation or when you want to stop playing temporarily in the middle of a record. When playing records manually, move the tonearm to the required position using the tonearm movement control, then press this button to lower the tonearm.

START/STOP: Press this side to play a record or to stop the playing of the record. When this is pressed to start playing a record, it acts as the start button and when this is pressed while a record is being played, it acts as the stop button.

Note:

When using the UP/DOWN & START/STOP button or the <, > button, be sure to press one end of the button.

❺ Arm rest

❻ Linear tracking tonearm

In record cutting, a linear tracking arm is used to cut a groove with very close correspondence to the original signal.

To enable the tonearm to follow the signal in exactly the same way as in record cutting, it is preferable to have a tonearm working on the same linear tracking principles.

The main advantages of this tonearm are:

1. Because there is almost no tracking error, high frequency harmonic distortion is eliminated.
2. Because no inside force is generated, the pressure of the stylus on the left and right walls of the groove is equal so that channel separation is improved, tracking ability is better and intermodulation distortion is greatly reduced.
3. Because the tonearm is shorter, its weight is reduced; this improves tracking ability together with low frequency response.

❼ MANUAL SPEED button

The platter speed is selected automatically, but if the record is a 45 rpm LP or a 33-1/3 rpm EP, this button is used for manual speed selection.

Once this button is pressed, only the manual select function is engaged. When play is completed (or the START/STOP button is pressed), the auto speed select function is reactivated.

❽ Indicators

REPEAT indicator:
Lights red when the REPEAT button is set to on.
45 speed indicator:
Lights red when 45 rpm is selected.
Quartz Lock indicator:
Lights green when the platter speed is correct.
33 speed indicator:
Lights red when 33-1/3 rpm is selected.

Note:

The "33" speed indicator lights whatever the record speed when the power is switched on and the tonearm is on the rest.

5. Description of Technology

5-(1) Servo cueing

This "servo cueing" system, in which the technology in Y series ED servo tonearms is utilized, is sthe same as the system in which the motor speed is subject to servo control. Its mechanism is like a linear plunger with its rotating angle reduced to 40°.

The basis of this servo system is exactly the same as the arm drive in the Y series, with the exception of the arm UP/DOWN bias generation and overall loop gain.

5-(2) New motor

5-(2)-1 Basic operation of new quartz locked motor

Motor MC953C in the QL-L2 performs a basic operation which is almost the same as that of a conventional quartz locked motor, but the drive circuit of the power stage is different. For the basic quartz locking principle, the concept applied to conventional motors is used as it is.
As shown in Fig. 6, the FG signal from the motor is amplified in an IC block, shaped into a rectangular wave by the Schmitt circuit and processed in IC1. This wave is differentiated digitally. One derivative is delayed by the double servo, the other is phase compared with the reference signal (obtained by dividing the quartz OSC signal), controlled by F/V and P/D sample holding and converted into a DC voltage. This DC voltage is amplified in IC2 to drive the drive stage directly.

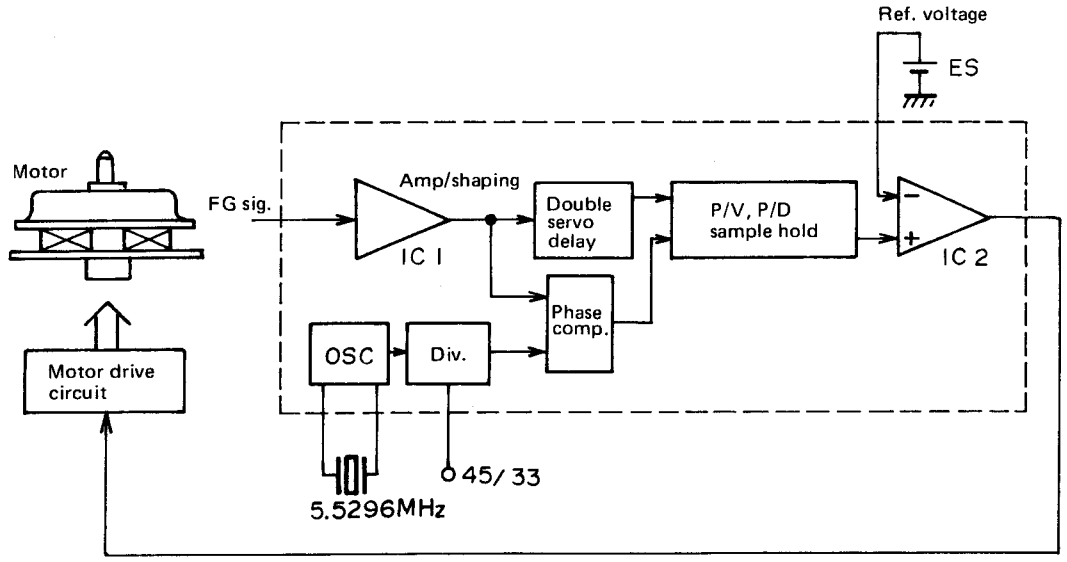


Fig. 6

Quartz Lock IC VC4052

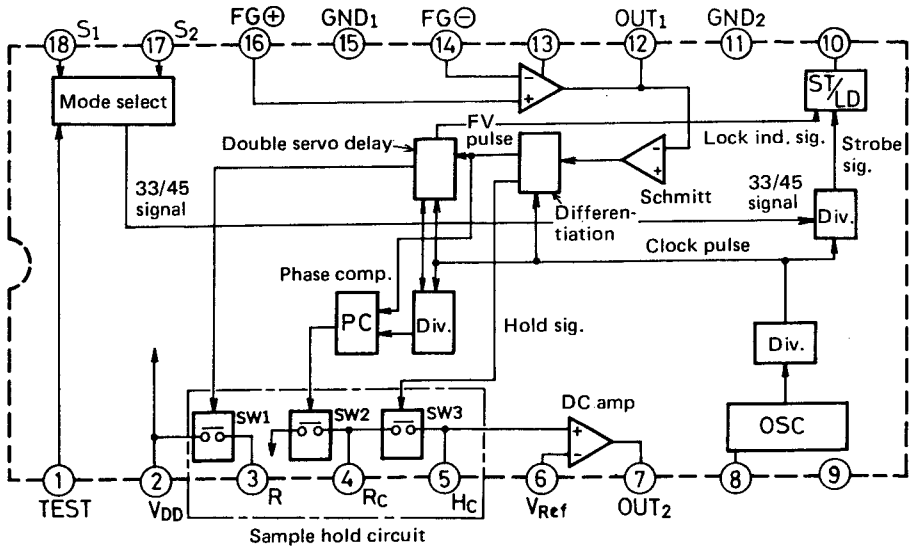


Fig. 7

5-(2)-2 Drive circuit

In the motor drive circuit, a current flows across each of the coils (connected in "H") only at electrical angle of 180°. This circuit has four switches as shown below.

The Hall elements are placed at an electrical angle interval of 90° and each element provides a sinewave output with a phase deviation of 90° from that of the other element. Each switch is ON-OFF controlled by the output of a Hall element as shown in the timing chart.

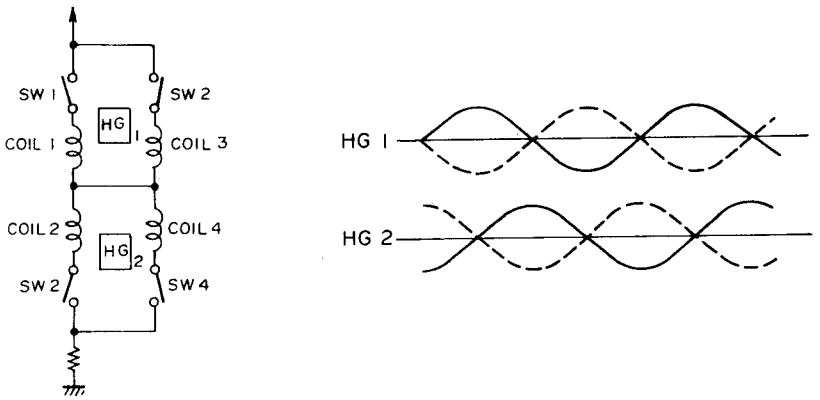


Fig. 8

As shown in the timing chart, wehn SW1 turns ON, current flows in coil 1, and when SW3 turns ON, current flows in coil 3. Likewise, when SW2 turns ON, current flows in coil 2, and when SW4 turns ON, current flows in coil 4. The torque generated in these coils is obtained as shown in the diagram. In the practical circuit, transistors are used for switches and are controlled by the Hall output processed previously in the differential circuit. The coil current is subject to current feedback so that it can be controlled by the input voltage.

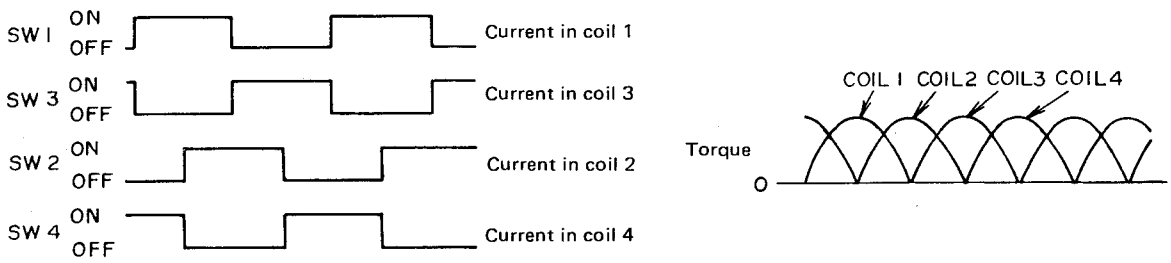


Fig. 9

Q6 compares the input voltage and the feedback voltage and amplifies the input voltage. Then, Q9 converts the input into a current which is in turn supplied to the emitters of Q5 and Q6. Q5 and Q6 share the common emitter current from the output of HG2. Each section of current controls switching transistors Q1 – Q4. To fix the coil midpoint voltage, it is connected with the emitters of Q7 and Q8 through R7.

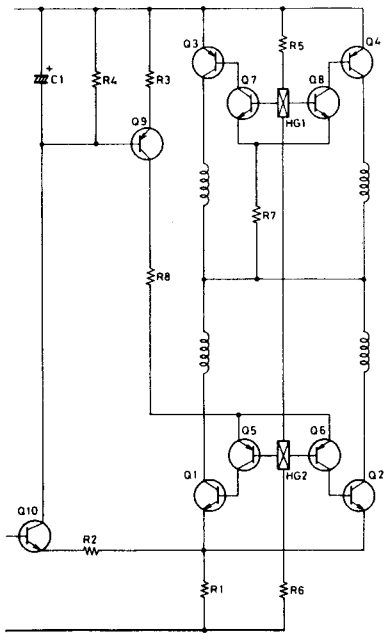


Fig. 10

5-(3) Detection of presence/absence of record and size select circuit

- The presence or absence of a record is detected by light from the lamp passing through the slits in the platter.

Every time a slit passes over the phototransistor, an output pulse is obtained from pins A and B.
Outputs A and B depend on the record size with "pulse present" represented by 1 and "no pulse" represented by 0.

Output	A	B
30 cm record	0	0
17 cm record	0	1
No record	1	1

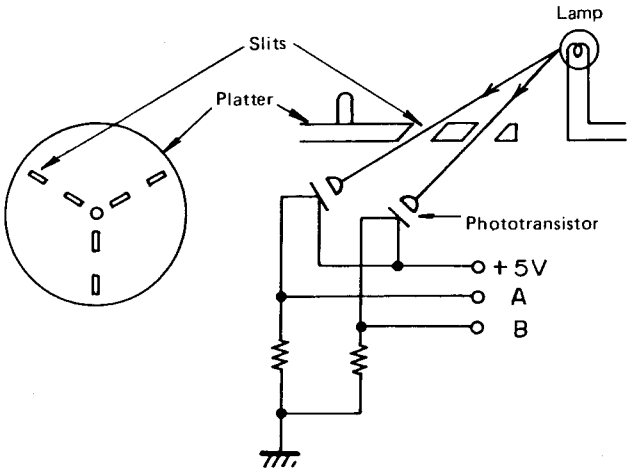


Fig. 11

Output A is used to detect the presence/absence of a record and output B the size of the record.

- Output A enters the microcomputer directly.
- Output B is converted to a continuous signal by the circuit shown in Fig. 12 before entering the micro-computer.

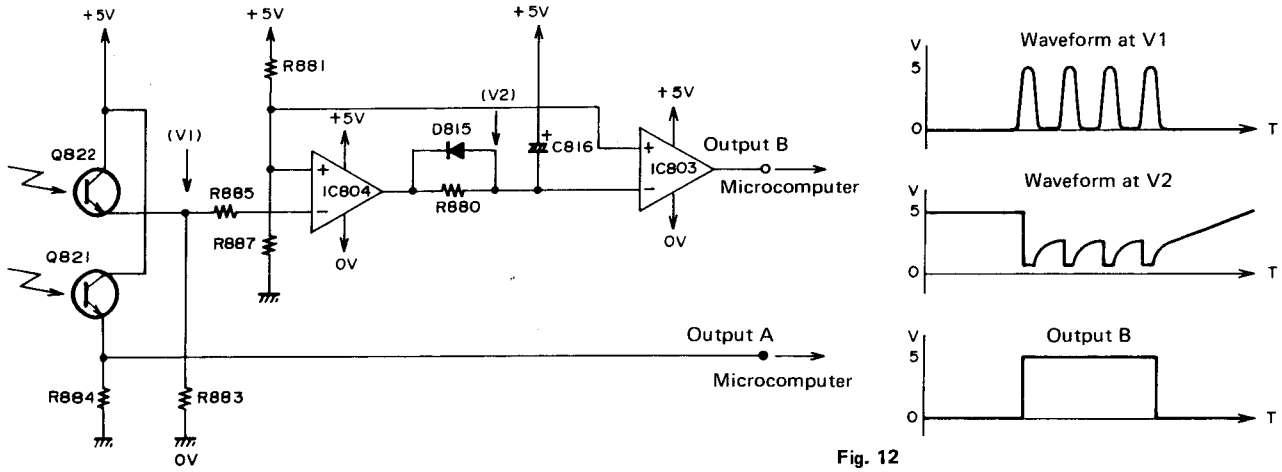


Fig. 12

5-(4) Pin function of microcomputer (LM6416E)

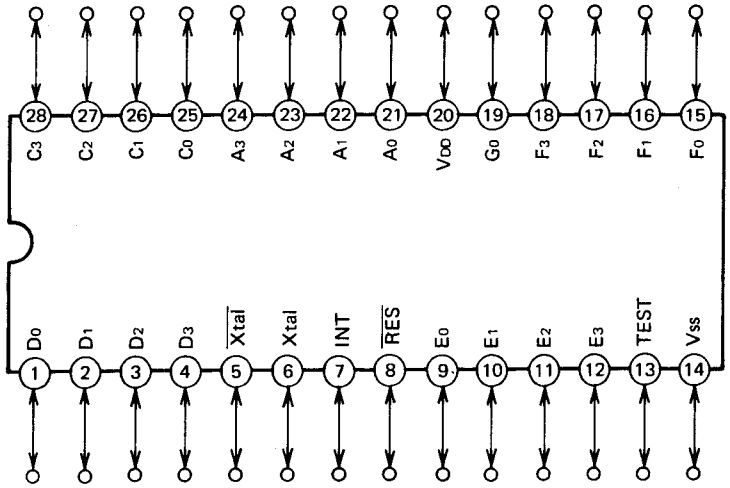


Fig. 13

Pin 1: Speed select input
Pin 2: Arm up input ("L" with arm up)
Pin 3: Arm down input ("H" with arm down)
Pin 4: Arm position detection pulse input
Pulses resulting from arm motion are counted to judge arm position.
Pins 5 and 6: OSC circuit
Pin 7: 0 V
Pin 8: Microcomputer initial reset
Pin 9: –
Pins 10 and 11: Arm motion

Function / Pin	Stop	Right	Left
10	H	H	L
11	H	L	H

Pin 12: Arm up output
Pin 13: 0 V
Pin 14: 0 V
Pin 15: 33 RPM output (at "L")
Pin 16: 45 RPM output (at "L")
Pin 17: –
Pin 18: Motor ON/OFF ouptut (ON at "L")
Pin 19: REPEAT display output (at "L")
Pin 20: 5 V
Pin 21: Arm UP/DOWN switch input
Pin 22: Left motion "<" switch input
Pin 23: Right motion ">" switch input
Pin 24: START/STOP switch input
Pin 25: Record size input (ON at "L")
Pin 26: Record presence/absence input (At "H", judges record absent.)
Pin 27: REST switch input ("H" with arm on the rest)
Pin 28: REPEAT switch input

6. Removal Procedures

6-(1) Replacement of stylus

How to remove the old stylus (Figs. 14 and 15)
Hold the cartridge and press the end of the stylus assembly in the direction of the arrow.
How to fit a new stylus (Figs. 14 and 15)
Being careful not to touch the stylus tip, fit the stylus assembly on the cartridge in the direction of the arrow.
Note:
The service life of the stylus depends on conditions of use; the standard is between 800 and 1600 hours.

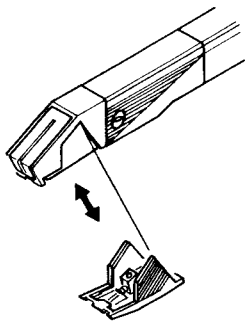


Fig. 14

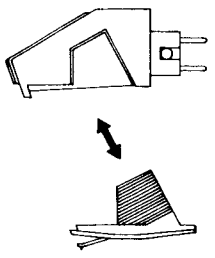


Fig. 15

6-(2) Replacement of cartridge

1. Remove the cartridge fixing screw (Fig. 16).
2. Pull the cartridge forward as shown in Fig. 17.

Note:
A plug-in cartridge is used for the QL-L2. Therefore, specify a T4P type cartridge (JVC Model No. Z-45EP) when purchasing a new cartridge.

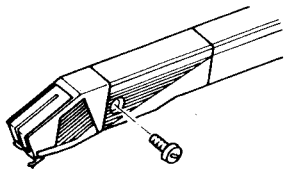


Fig. 16

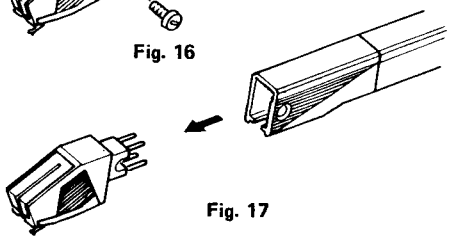


Fig. 17

6-(3) Removal of cabinet

(1) Remove the four foot mounting screws from the bottom board.
(2) Remove the cord stopper of the signal cord.
(3) Remove the tonearm cover and the two pan head screws in the base of the arm as shown in Fig. 18. In addition, be sure to cover the stylus with the stylus cover to protect it.
(4) While holding the pipe joint by hand, pull the arm pipe slightly towards you (Step 1) and lift the arm pipe until it stops. (Step 2)
(5) Remove the cabinet cover at the base of the arm. (Step 3) (Move out the cabinet cover to the rear while pressing down the area marked by an arrow as shown in Fig. 20.)
(6) Set up the cabinet paying attention to the arm and rest sections.
At this time, note that the cabinet and the bottom cover are joined using wires, etc.

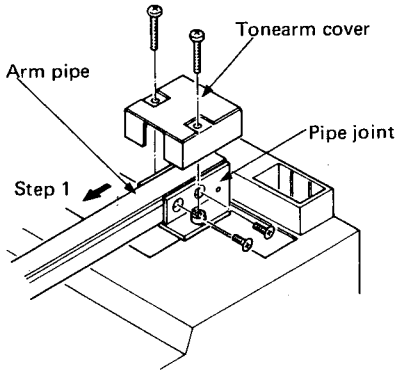


Fig. 18

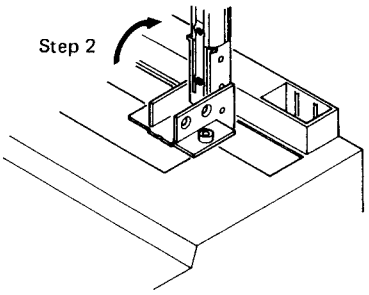


Fig. 19

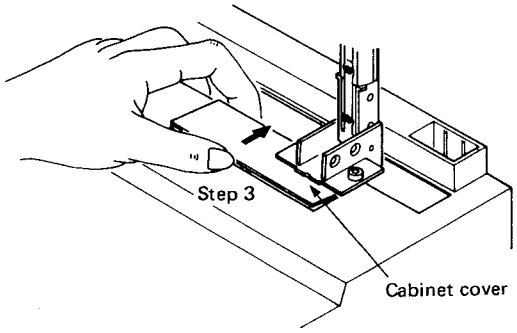


Fig. 20

6-(4) Removal of arm angle photocoupler P.C. board

1. Remove the stopper screw. (Fig. 22)
2. Turn the screw counterclockwise as shown in Fig. 21. Then, in the state in Fig. 21, pull out the board.

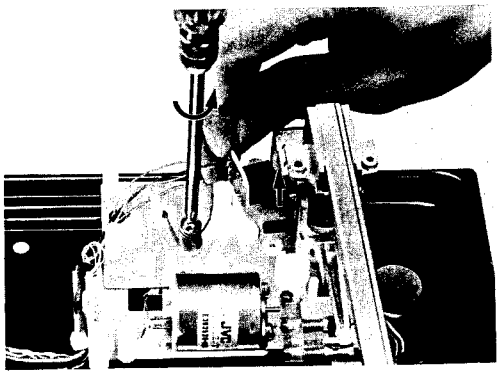


Fig. 21

6-(5) Replacement of cueing motor and installation of elevator

1. To remove the motor, remove screws ① and ② as shown in Fig. 22.
2. After replacing the motor, install the elevator in the following procedure.
   (1) Set the arm height adjustment cam "A" as shown in Fig. 23 in reference to the elevator lever.
   (2) While pushing the elevator lever against cam "A" with a finger, turn the lead terminal section of the motor rotor fully clockwise, then return it about 8° and tighten the setscrew.
   (In the state that the lead terminal section is returned about 8°, its clearance from the resin part is about 2 mm as shown in Fig. 24.)

Notes: 1. After setting the elevator lever, lock the setscrew with adhesive.
2. After replacing the cueing motor, be sure to perform all adjustments again.

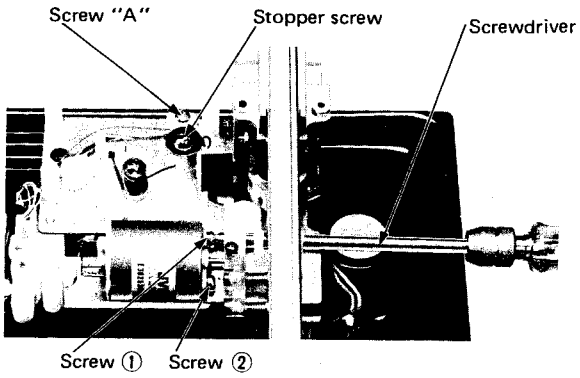
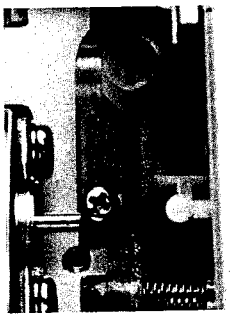


Fig. 22



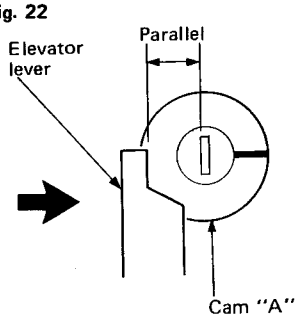
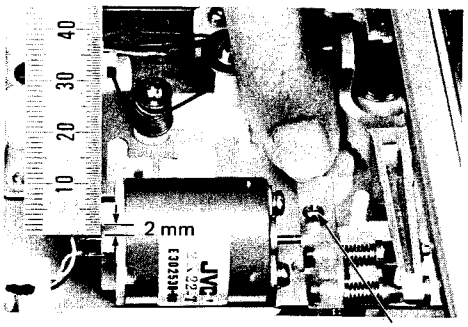


Fig. 23



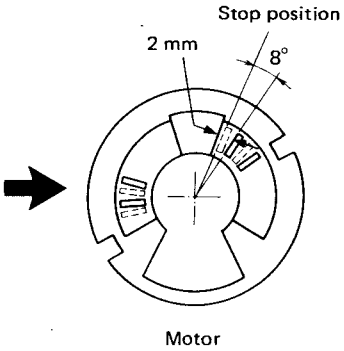


Fig. 24

6-(6) Removal of arm ass'y

1. Remove screw "A" (in Fig. 22), then remove the mechanism base ass'y from the bottom board.
2. Unsolder the lead wires of the tonearm.
3. Untighten the screw shown in Fig. 25, then pull out the stopper.
4. Pull out the arm ass'y upwards.

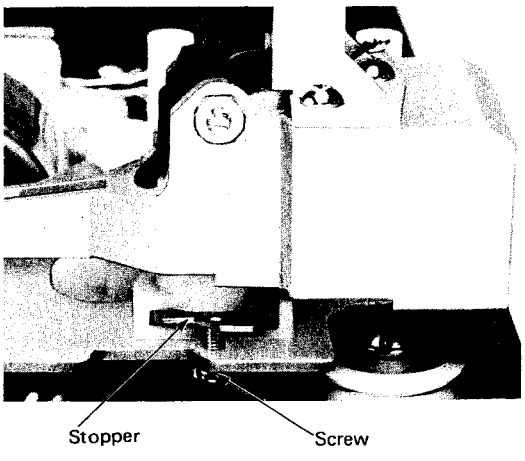


Fig. 25

7. Rope Stringing

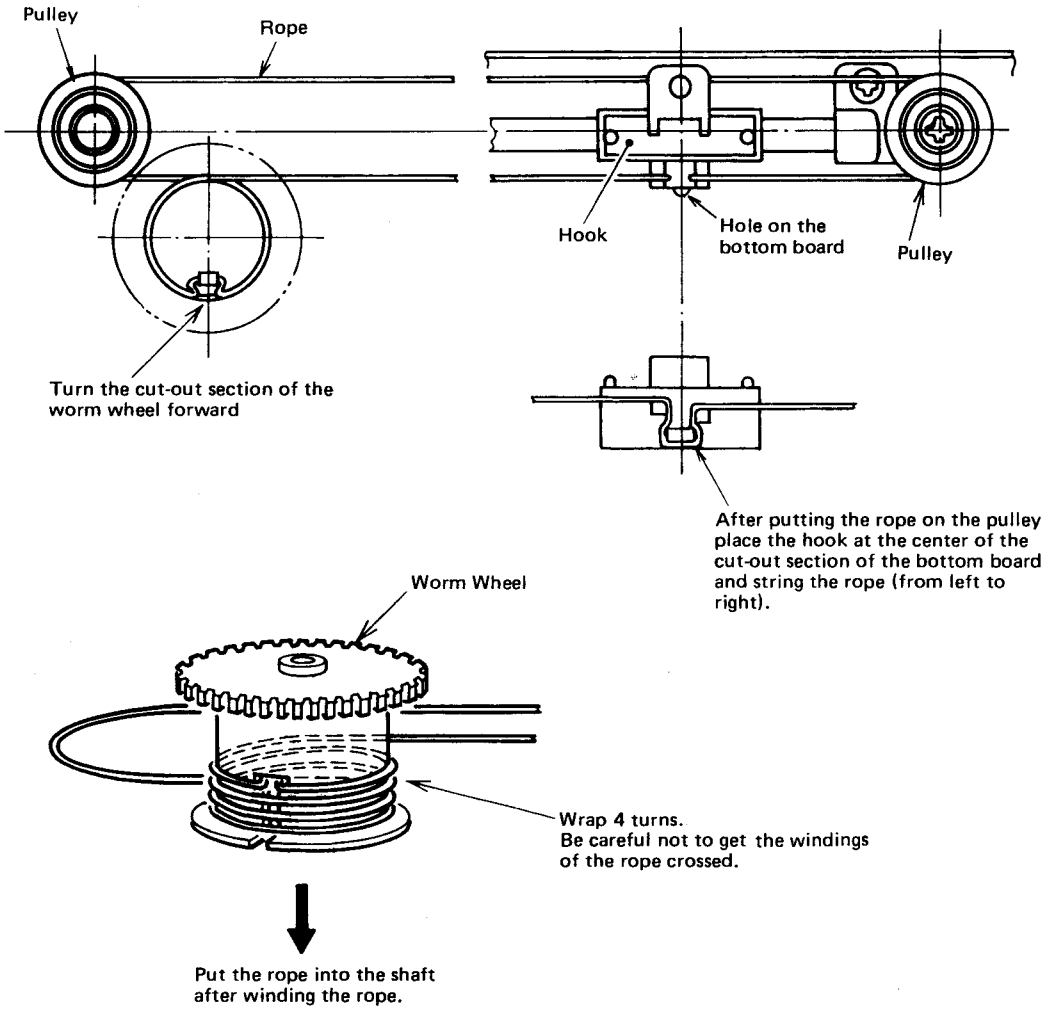

Pulley
Rope
Hook
Hole on the bottom board
Pulley
Turn the cut-out section of the worm wheel forward
After putting the rope on the pulley place the hook at the center of the cut-out section of the bottom board and string the rope (from left to right).
Worm Wheel
Wrap 4 turns.
Be careful not to get the windings of the rope crossed.
Put the rope into the shaft after winding the rope.

Fig. 26

8. Adjustment Procedures

8-(1) Arm parallel adjustment

With the elevator lever lifted up, adjust so that the center line of the pipe arm and the longitudinal outline of the bottom board are parallel using pin "b". (Fig. 27)

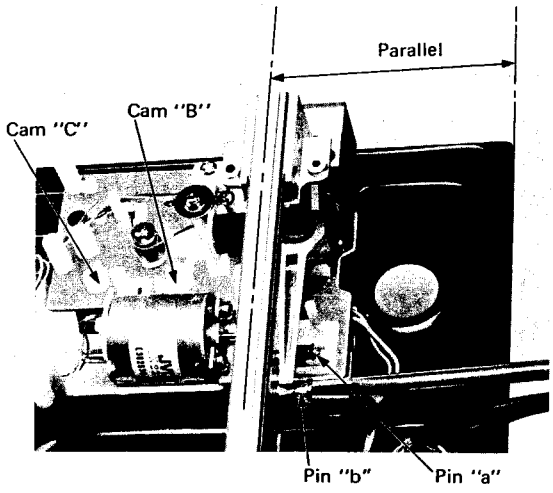
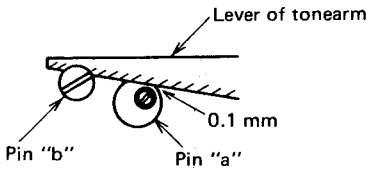


Fig. 27

8-(2) Stylus height adjustment

(1) With the elevator lifted up, adjust the height from the record surface to the cartridge body using cam "A". (Fig. 28)
Note: Cam "A" has no directionality.

(2) After adjusting the stylus height, adjust the clearance between pin "a" and the under side of the lever of the tonearm to about 0.1 mm by turning pin "a". (Fig. 29)
(The clearance should be as small as possible.)
Note: Pin "a" turns 360°, but adjust in the right angular range of 180°. (Adjust with pin "a" set toward the pivot center.)



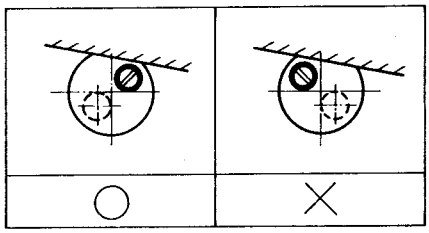


Fig. 29

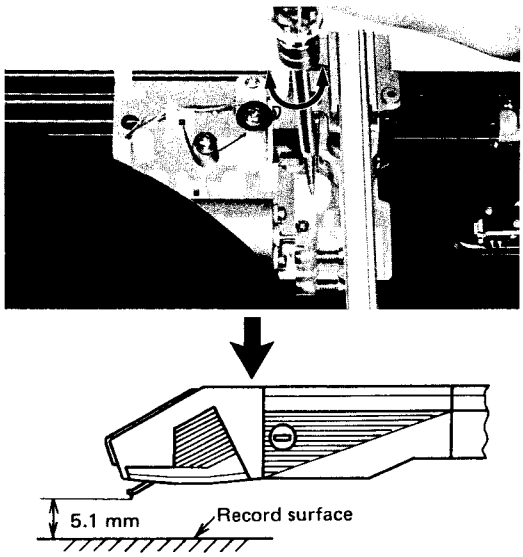


Fig. 28

8-(3) Offset adjustment

(1) Move the arm to the left to release it from the rest.
(2) Lift the elevator.
(3) Adjust the output voltage of the arm offset angle detecting photointerrupter to 30±5 mV by turning cam "B" (Fig. 27). This output voltage is measured between test points TP-1 and TP-2 with a short between test points TP-1 and TP-2 with a short between TP-3 and TP-4.

8-(4) Lead-in adjustment

Adjust the 30-cm lead-in count to 23 ±2 by turning cam "C". In addition, check the 17-cm lead-in and lead-out.

	Test record	Count	–
30 cm lead-in	SS-4343	23 ±2	Adjustment
17 cm lead-in	SS-4445	23 ±5	Check
17 cm lead-out	SS-4445	26 ±2	Check

9. Block Diagram

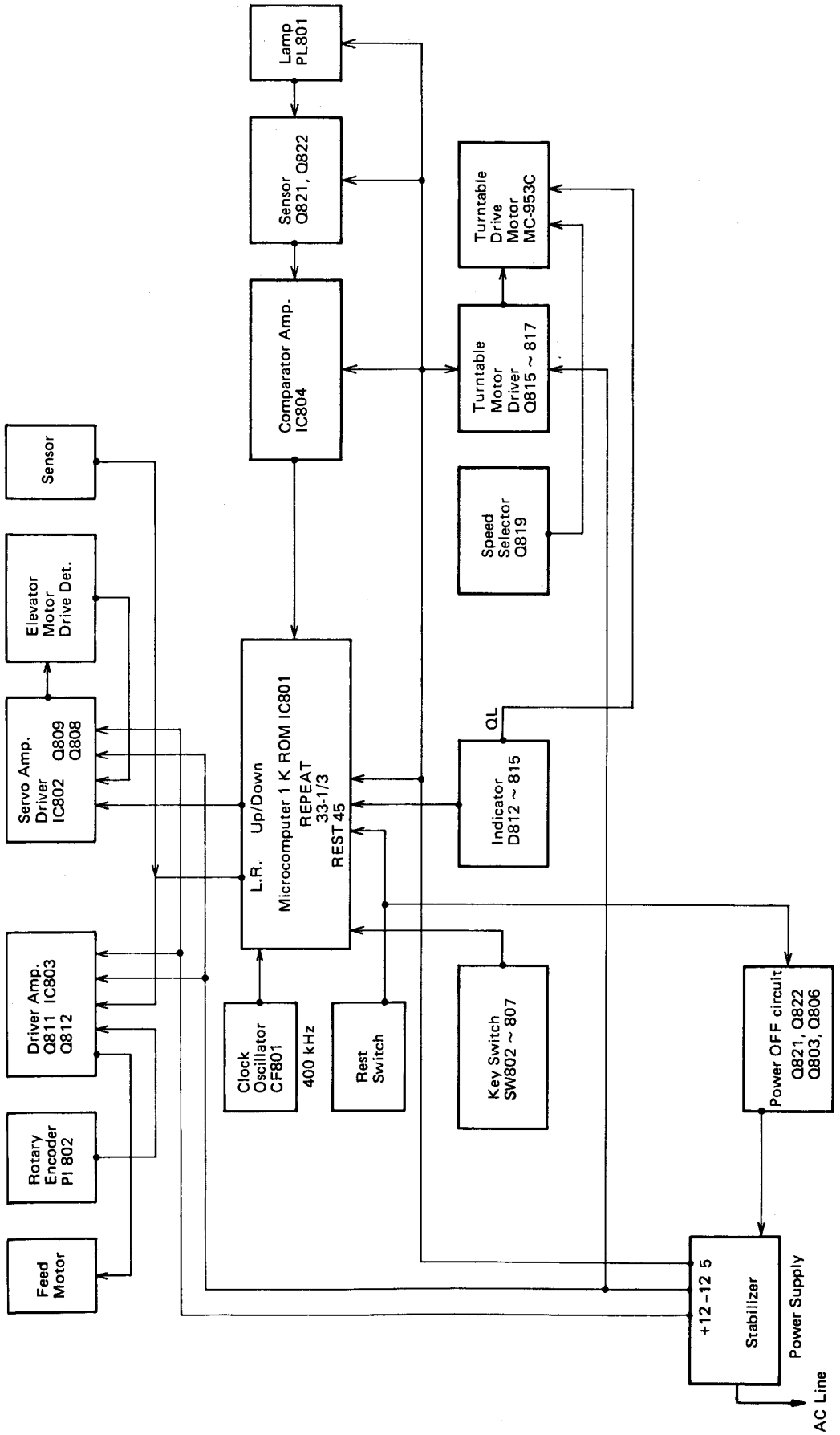


Fig. 30

10. Connection Diagram

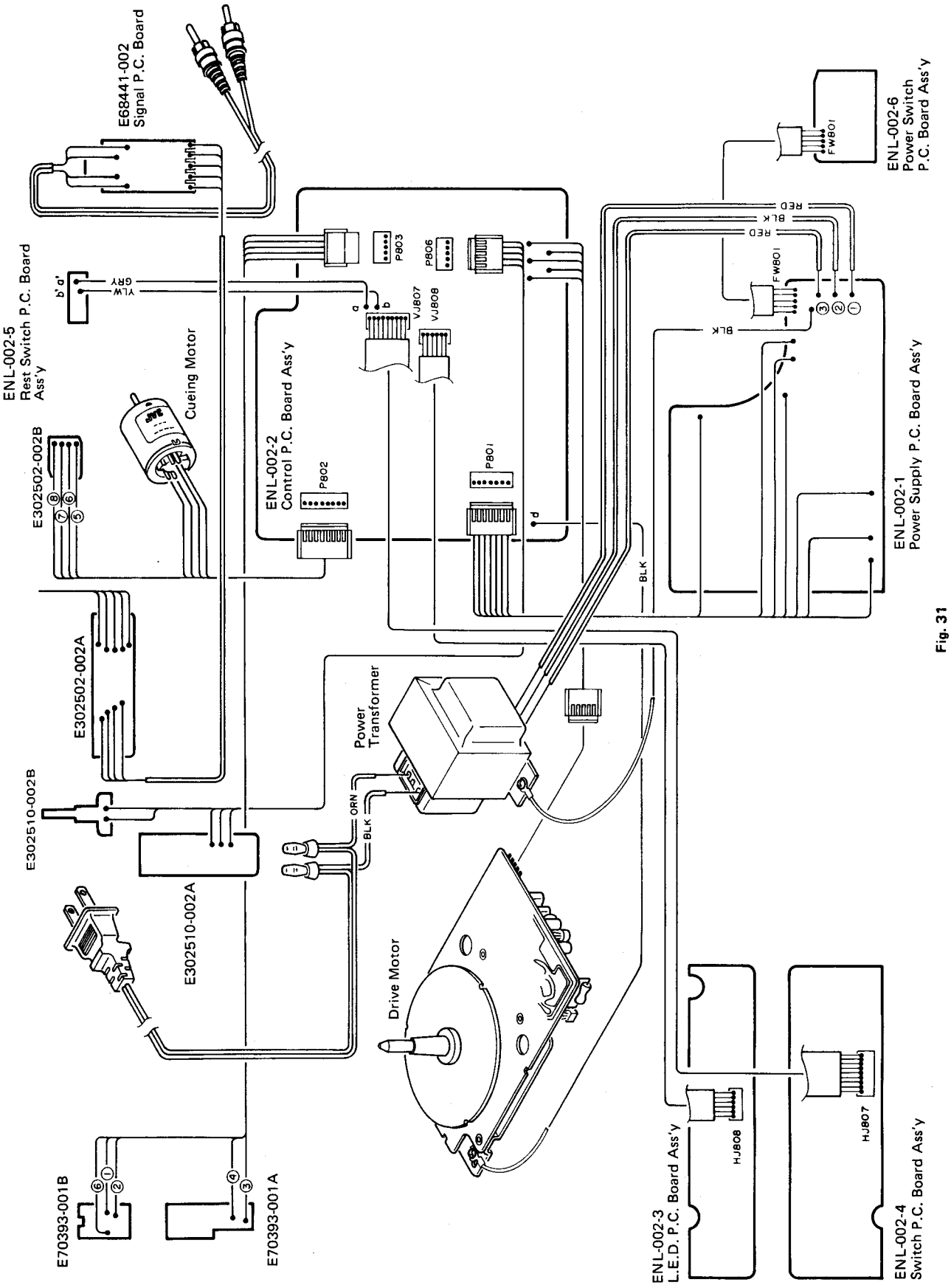


Fig. 31

11. Exploded Views and Part Numbers

11-(1) Platter and cabinet

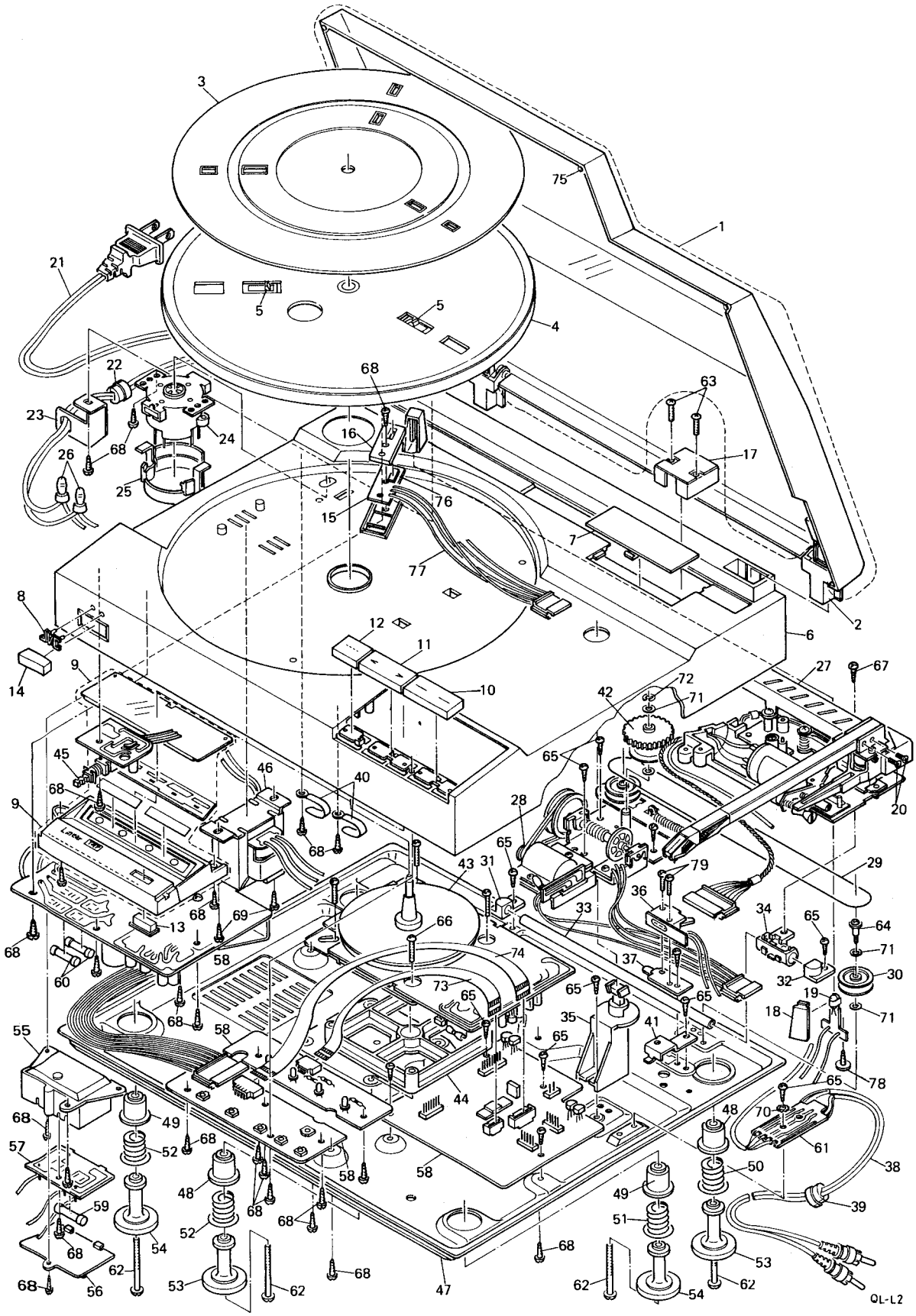


Fig. 32

Item No.	Part Number	Description	Q'ty
1	E24402-002	Dust Cover Ass'y	1
2	E70081-001	Hinge Ass'y	2
3	E24288-003	Platter mat	1
4	E24287-001	Platter	1
5	E69896-002	Lens	3
6	E302684-001	Cabinet Ass'y	1
7	E302676-001	Cover	1
8	E69212-001	Mark	1
9	E302686-001	Panel Ass'y	1
10	E302671-004	Button (START/STOP)	1
11	E302671-003	Button (< , >)	1
12	E302672-002	Button (REPEAT)	1
13	E70250-001	Button (MANAUAL SPEED)	1
14	E302670-001	Button (POWER)	1
15	E302510-002	Size Select P.C. Board	1
16	E70461-001	Mask	1
17	E24399-001	Arm Cover	1
18	E69883-002	Lens	1
19	QLP3204-001	Lamp	1
20	SSSP2606N	Screw	2
21	See page 29	Power Cord ⚠	1
22	See page 29	Cord Stopper ⚠	1
23	E70291-001	Bracket	1
24	See page 29	Voltage Selector ⚠	1
25	See page 29	V. Selector Cover	1
26	See page 29	Connector ⚠	2
27	See page 17	Mechanism Base Ass'y	1
28	See page 17	Motor Gear Ass'y	1
29	E70476-002	Rope Ass'y	1
30	E69850-002	Pulley (M)	1
31	E302498-001	Pipe Holder (L)	1
32	E302498-002	Pipe Holder (R)	1
33	E69849-002	Pipe	1
34	E70145-002	Hook Ass'y	1
35	E302673-002	Arm Rest	1
36	QSS1201-034	Slide Switch	1
37	E68712-001	Bracket	1
38	See page 29	Signal Cord	1
39	QHS3876-252	Cord Stopper	1
40	E50670-005	Wire Clamp	2
41	E69852-001	Bracket	1
42	E302507-001	Gear	1
43	MC953C	Motor Ass'y	1
44	E302500-002	Motor Holder	1
45	QST4101-E09	Push Switch	1
46	See page 29	Power Transformer ⚠	1
47	E108383-001	Bottom Board	1
48	E69854-004	Insulator (Rear, L, R)	2
49	E69854-006	Insulator (Front, L, R)	2
50	E69855-002	Spring (Rear R)	1
51	E69855-001	Spring (Front R)	1
52	E69855-003	Spring (Front/Rear L)	2
53	E70042-001	Foot (Rear L, R)	2
54	E700373-001	Foot Ass'y (Front, L, R)	2
55	See page 29	P.C. Board Case	1
56	See page 29	P.C. Board Cover	1
57	See page 29	P.C. Board (TPS-332)	1
58	See page 29	P.C. Board (ENL-002)	1
59	See page 29	Fuse (Primary) ⚠	1
60	See page 29	Fuse (Secondary) ⚠	2

⚠ : Safety Parts

Item No.	Part Number	Description	Q'ty
61	E68441-002	Signal P.C. Board	1
62	GBSF3045Z	Screw	4
63	SDSP2612N	Screw	2
64	E69851-002	Screw	1
65	SBST3006Z	Screw	16
66	SBST3018Z	Screw	4
67	DPSP3008Z	Screw	1
68	SBSF3008Z	Screw	20
69	SBSF3010Z	Screw	2
70	WBS3000N	Washer	1
71	Q03093-817	Washer	4
72	REE3000X	E. Ring	1
73	EWR16E-20SS	Flat Wire	1
74	EWR19E-25SS	Flat Wire	1
75	E69897-001	Cushion	3
76	E70462-001	Filter	1
77	EWS015-095	Socket Wire Ass'y	1
78	E65923-003	Screw	1
79	SPSP2008Z	Screw	2

11-(2) Motor gear ass'y

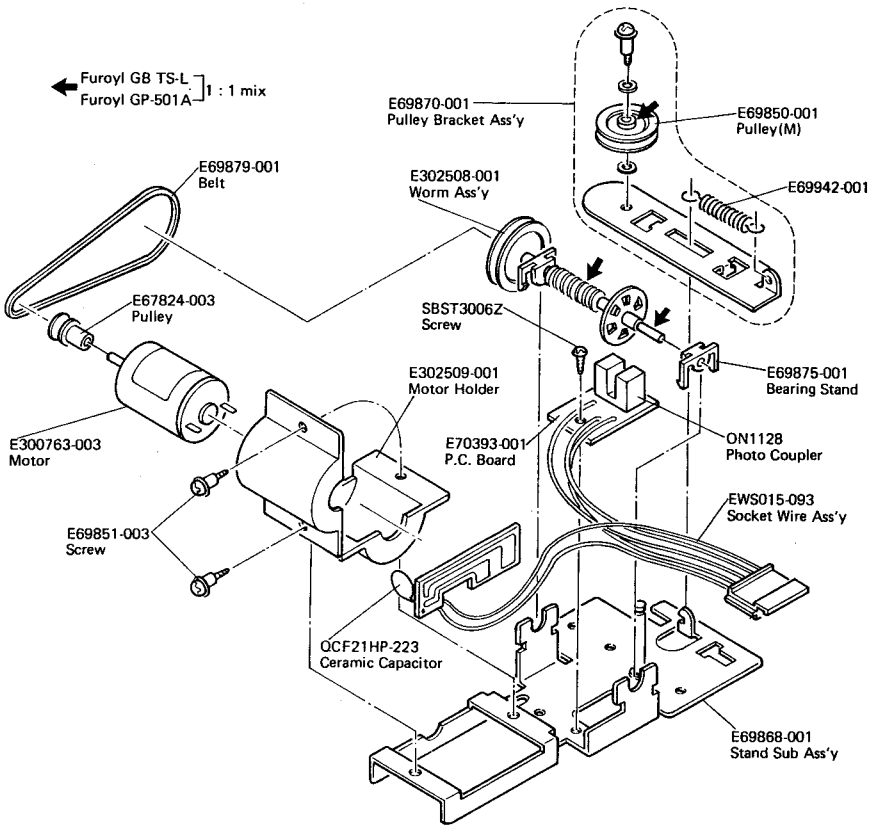


Fig. 33

11-(3) Mechanism base ass'y

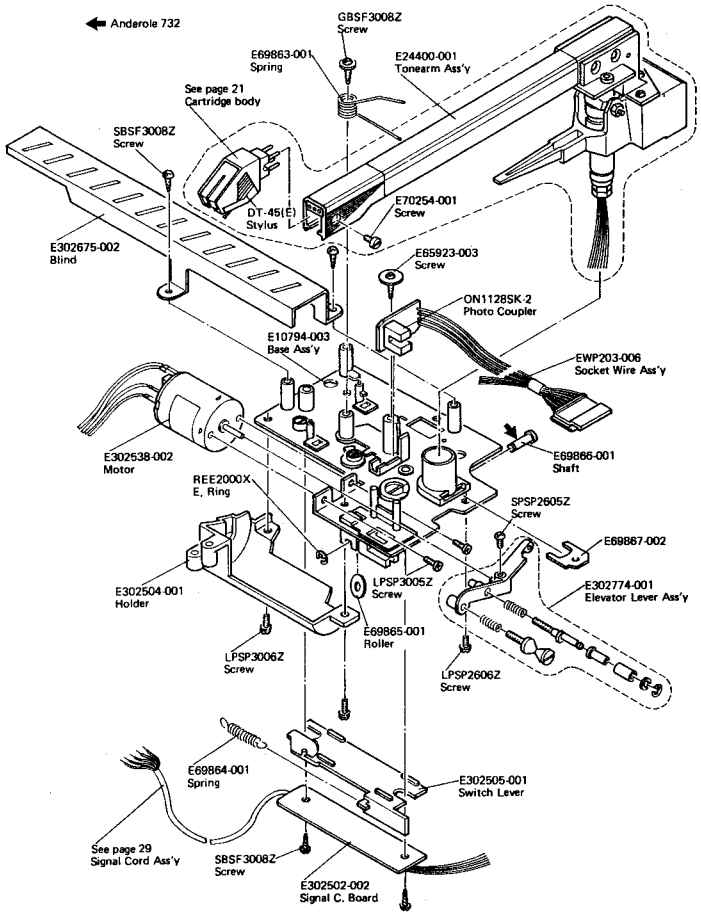


Fig. 34

12. Printed Circuit Board Ass'y and Parts List

12-(1) ENL-002 □ main amp., power supply & control P.C. board ass'y

Note (1): The number of ENL-002□ varies according to the area employed. See table below.

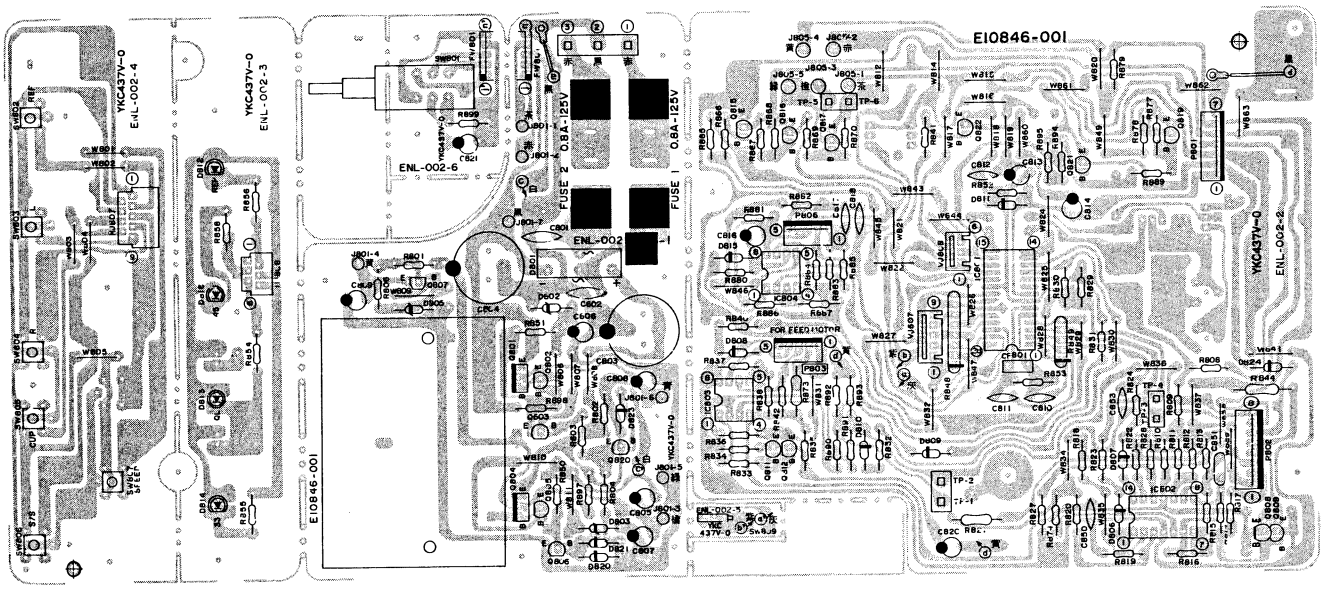


Fig. 35

Note: This P.C. board is ENL-002A.

Each Individual P.C. Board Location

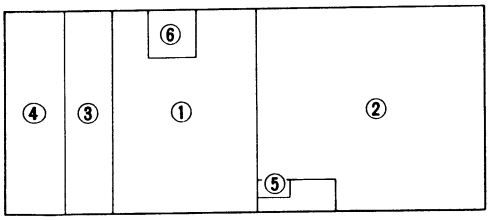


Fig. 36

① ENL-002-1: Power Supply P.C. Board Ass'y
② ENL-002-2: Control P.C. Board Ass'y
③ ENL-002-3: L.E.D. P.C. Board Ass'y
④ ENL-002-4: Switch P.C. Board Ass'y
⑤ ENL-002-5: Rest Switch P.C. Board Ass'y
⑥ ENL-002-6: Power Switch P.C. Board Ass'y

Transistors

ITEM	PART NUMBER	DESCRIPTION	MAKER
Q801	2SD1265A(O,P)	SILICON	MATSUSHITA
Q802	2SA733A(P,Q)	SILICON	NEC
Q803	2SC945A(P,Q)	SILICON	NEC
Q804	2SB941A(P,Q)	SILICON	MATSUSHITA
Q805	2SC945A(P,Q)	SILICON	NEC
Q806	2SC945A(P,Q)	SILICON	NEC
Q807	2SD571(L,K)	SILICON	NEC
Q808	2SA1015(Y,GR)	SILICON	TOSHIBA (for -002A)
Q809	2SC1815(Y,GR)	SILICON	TOSHIBA (for -002A)
Q811	2SC2120(O,Y)	SILICON	TOSHIBA
Q812	2SA950(O,Y)	SILICON	TOSHIBA
Q815	2SC945A(P,Q)	SILICON	NEC
Q816	2SA733A(P,Q)	SILICON	NEC
Q817	2SC945A(P,Q)	SILICON	NEC
Q819	2SA733A(P,Q)	SILICON	NEC
Q820	2SA733A(P,Q)	SILICON	NEC
Q821	2SC945A(P,Q)	SILICON	NEC
Q808	2SB605 (K, L)	SILICON	NEC (for -002B)
Q809	2SD571 (L, K)	SILICON	NEC (for -002B)

Note (1)

Designated Areas	P.C. Board Ass'y
U.S.A. & Canada	ENL-002A
All Other Areas	ENL-002B

Note (2)

The symbols (赤 , 黒 , 白 . . . etc.) on P.C. Board surface are factory process only.

ICs

ITEM	PART NUMBER	DESCRIPTION	MAKER
IC801	LM6416E-185		SANYO
IC802	NJM2058DA		DAINICHI
IC803	NJM4558D		DAINICHI
IC804	NJM4558D		DAINICHI

Diodes

ITEM	PART NUMBER	DESCRIPTION	MAKER
D801	S1RBA20F1	SILICON	SHINDENGEN
D802	HZ12A2-L	SILICON	HITACHI
D803	HZ12A2-L	SILICON	HITACHI
D805	RD5.6EB3	SILICON	NEC
D806	1S2076-31	SILICON	HITACHI
D807	1S2076-31	SILICON	HITACHI
D808	1S2076-31	SILICON	HITACHI
D809	1S2076-31	SILICON	HITACHI
D810	1S2076-31	SILICON	HITACHI
D811	1S2076-31	SILICON	HITACHI
D812	SR603C	L.E.D.	NEC
D813	SLR-54GC4	L.E.D.	ROHM
D814	SR603C	L.E.D.	NEC
D815	1S2076-31	SILICON	HITACHI
D816	SR603C	L.E.D.	NEC
D820	1S2076-31	SILICON	HITACHI
D821	1S2076-31	SILICON	HITACHI

Capacitors

ITEM	PART NUMBER	DESCRIPTION		
C801	QCE22HP-103	0.01UF	500V	CERAMIC
C8Q2	QCE22HP-103	0.01UF	500V	CERAMIC
C803	QEU51EM-108	1000μF	3.5 V	ELECTRO
C804	QEU51EM-108	1000μF	3.5 V	ELECTRO
C805	QET51EM-476	47UF	25V	ELECTRO
C806	QET51EM-476	47UF	25V	ELECTRO
C807	QET51EM-476	47UF	25V	ELECTRO
C808	QET51EM-476	47UF	25V	ELECTRO
C809	QET51CM-476	47UF	16V	ELECTRO
C810	QCS21HJ-221	220PF	50V	CERAMIC
C811	QCS21HJ-221	220PF	50V	CERAMIC
C812	QCF21HP-223	0.022UF	50V	CERAMIC
C813	QET51EM-106	10UF	25V	ELECTRO
C814	QET51EM-106	10UF	25V	ELECTRO
C816	QET51HM-105	1UF	50V	ELECTRO
C817	QCF21HP-223	0.022UF	50V	CERAMIC
C818	QCF21HP-223	0.022UF	50V	CERAMIC
C820	QET51EM-106	10UF	25V	ELECTRO
C821	QET51CM-476	47UF	16V	ELECTRO
C850	QCF21HP-223	0.022UF	50V	CERAMIC
C851	QFN81HJ-473	0.047UF	50V	MYLAR

Resistors

ITEM	PART NUMBER	DESCRIPTION		
R801	QRD141J-103S	10K	1/4W	CARBON
R802	QRD141J-103S	10K	1/4W	CARBON
R803	QRD141J-473S	47K	1/4W	CARBON
R804	QRD141J-472S	4.7K	1/4W	CARBON
R806	QRD141J-471S	470	1/4W	CARBON
R808	QRD141J-122S	1.2K	1/4W	CARBON
R809	QRD141J-122S	1.2K	1/4W	CARBON
R810	QRD141J-103S	10K	1/4W	CARBON
R811	QRD141J-104S	100K	1/4W	CARBON
R812	QRD141J-103S	10K	1/4W	CARBON
R813	QRD141J-273S	27K	1/4W	CARBON
R814	QRD141J-271S	270	1/4W	CARBON
R815	QRD141J-102S	1K	1/4W	CARBON
R816	QRD141J-223S	22K	1/4W	CARBON
R817	QRD141J-102S	1K	1/4W	CARBON
R818	QRD141J-103S	10K	1/4W	CARBON
R819	QRD141J-124S	120K	1/4W	CARBON
R820	QRD141J-561S	560	1/4W	CARBON
R821	QRD125J-4R7	4.7	1/2W	UNF.CARBON ⚠
R822	QRD141J-103S	10K	1/4W	CARBON
R823	QRD141J-123S	12K	1/4W	CARBON
R824	QRD141J-123S	12K	1/4W	CARBON
R827	QRD141J-124S	120K	1/4W	CARBON
R828	QRD141J-392S	3.9K	1/4W	CARBON
R829	QRD141J-102S	1K	1/4W	CARBON
R830	QRD141J-102S	1K	1/4W	CARBON
R831	QRD141J-333S	33K	1/4W	CARBON
R832	QRD141J-333S	33K	1/4W	CARBON
R833	QRD141J-271S	270	1/4W	CARBON
R834	QRZ0062-100	10		FUSIBLE ⚠
R835	QRZ0062-100	10		FUSIBLE ⚠
R836	QRD141J-824S	820K	1/4W	CARBON
R837	QRD141J-103S	10K	1/4W	CARBON
R838	QRD141J-103S	10K	1/4W	CARBON
R840	QRD141J-123S	12K	1/4W	CARBON
R842	QRD141J-183S	18K	1/4W	CARBON
R844	QRD125J-821	820	1/2W	UNF.CARBON
R848	ERGS7XK-103			RESISTOR ARRAY
R849	ERGS4XK-103			RESISTOR ARRAY
R852	QRD141J-103S	10K	1/4W	CARBON
R853	QRD141J-105S	1M	1/4W	CARBON
R854	QRD141J-222S	2.2K	1/4W	CARBON
R855	QRD141J-102S	1K	1/4W	CARBON
R856	QRD141J-102S	1K	1/4W	CARBON
R858	QRD141J-102S	1K	1/4W	CARBON

Resistors

ITEM	PART NUMBER	DESCRIPTION		
R865	QRD141J-223S	22K	1/4W	CARBON
R866	QRD141J-223S	22K	1/4W	CARBON
R867	QRD141J-223S	22K	1/4W	CARBON
R868	QRD141J-103S	10K	1/4W	CARBON
R869	QRD141J-473S	47K	1/4W	CARBON
R870	QRD141J-223S	22K	1/4W	CARBON
R873	QRD141J-182S	1.8K	1/4W	CARBON
R874	QRD141J-103S	10K	1/4W	CARBON
R875	QRZ0062-100	10		FUSIBLE ⚠
R876	QRZ0062-100	10		FUSIBLE ⚠
R877	QRD141J-104S	100K	1/4W	CARBON
R878	QRD141J-472S	4.7K	1/4W	CARBON
R879	QRD141J-102S	1K	1/4W	CARBON
R880	QRD141J-105S	1M	1/4W	CARBON
R881	QRD141J-103S	10K	1/4W	CARBON
R882	QRD141J-223S	22K	1/4W	CARBON
R883	QRD141J-684S	680K	1/4W	CARBON
R884	QRD141J-684S	680K	1/4W	CARBON
R885	QRD141J-102S	1K	1/4W	CARBON
R886	QRD141J-473S	47K	1/4W	CARBON
R887	QRD141J-473S	47K	1/4W	CARBON
R889	QRD141J-102S	1K	1/4W	CARBON
R890	QRD141J-333S	33K	1/4W	CARBON
R891	QRD141J-333S	33K	1/4W	CARBON
R892	QRD141J-392S	3.9K	1/4W	CARBON
R893	QRD141J-392S	3.9K	1/4W	CARBON
R894	QRD141J-472S	4.7K	1/4W	CARBON
R895	QRD141J-103S	10K	1/4W	CARBON
R897	QRD141J-392S	3.9K	1/4W	CARBON
R898	QRD141J-392S	3.9K	1/4W	CARBON
R899	QRD141J-101S	100	1/4W	CARBON

⚠ : Safety Parts

Others

ITEM	PART NUMBER	DESCRIPTION
	E45524-002	FUSE CLIP
	E67764-002	TERMINAL ASS'Y
	E67764-103	WRAPPING TERMINAL
	EMG7331-001	FUSE CLIP
	EWT011-036	TERMINAL WIRE ASS'Y
	EWT011-038	TERMINAL WIRE ASS'Y
	E10846-001	CIRCUIT BOARD
	E10846-002	CIRCUIT BOARD
	E68712-001	BRACKET
	SBST3008Z	SCREW
	SPSP2008Z	SCREW
	E69894-002	HEAT SINK
P801	QMV5005-007	7P PLUG ASS'Y
P802	QMV5005-008	8P PLUG ASS'Y
P803	QMV5005-005	5P PLUG ASS'Y
P806	QMV5005-005	5P PLUG ASS'Y
HJ807	E04371-009B	9P SOCKET
HJ808	E04371-006B	6P SOCKET
SW801	QST4101-E09	PUSH SWITCH
SW802	ESP0001-008	PUSH SWITCH
SW803	ESP0001-008	PUSH SWITCH
SW804	ESP0001-008	PUSH SWITCH
SW805	ESP0001-008	PUSH SWITCH
SW806	ESP0001-008	PUSH SWITCH
SW807	ESP0001-008	PUSH SWITCH
SW809	QSS1201-034	SLIDE SWITCH
VJ807	E04371-009A	9P SOCKET
VJ808	E04371-006A	6P SOCKET
CF801	E03737-009	RESONATOR
FW804	EWR34B-08SS	FLAT WIRE
J801	EWS017-049	FLAT WIRE

12-(2) MC953C motor drive P.C. board ass'y

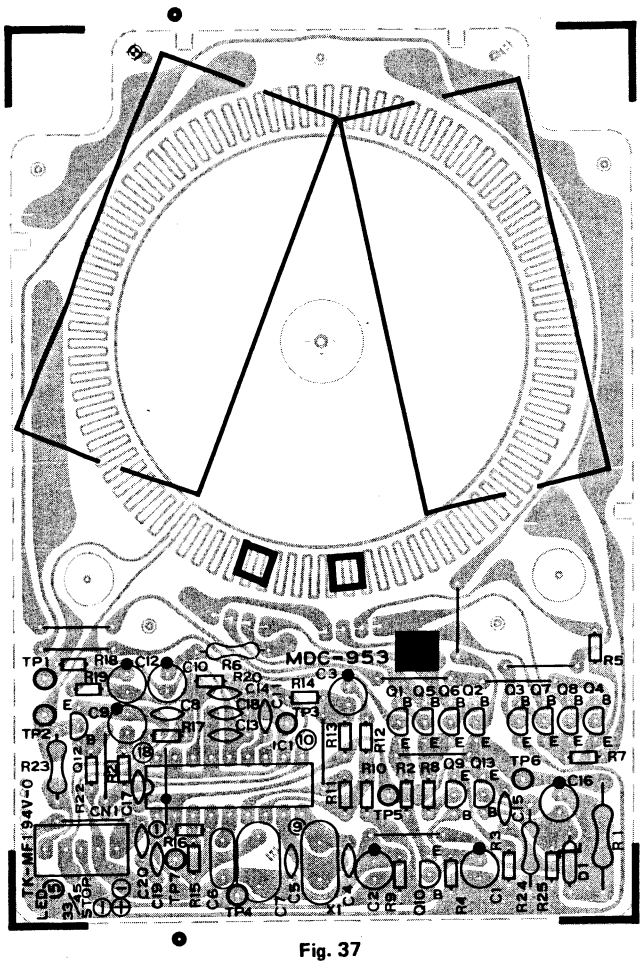


Fig. 37

Transistors

Item No.	Part Number	Rating	Description	
				Maker
Q1	2SC2120 (O, Y)		Silicon	Toshiba
Q2	2SC2120 (O, Y)		"	"
Q3	2SA950 (O, Y)		"	"
Q4	2SA950 (O, Y)		"	"
Q5	2SA1015 (Y, GR)		"	"
Q6	2SA1015 (Y, GR)		"	"
Q7	2SC1815 (Y, GR)		"	"
Q8	2SC1815 (Y, GR)		"	"
Q9	2SA1015 (GR)		"	"
Q10	2SC1815 (GR)		"	"
Q12	2SC1815 (Y, GR)		"	"
Q13	2SC2120 (O, Y)		"	"

IC

Item No.	Part Number	Rating	Description	
				Maker
IC1	VC4052		I.C.	Oki-Denki

Diode

Item No.	Part Number	Rating	Description	
				Maker
D1	RD5.6EL3		Zener	NEC

Capacitors

Item No.	Part Number	Rating		Description
C1	QET41HM-474	0.47 μF	50 V	Electrolytic
C2	QET41HM-225	22 μF	"	"
C3	QET41HM-105	1 μF	"	"
C4	QCT25CH-101	100 pF	"	Ceramic
C5	QCT25CH-101	"	"	"
C6	QFN41HK-223	0.022 μF	"	Poly. Film
C7	QFP31HJ-104	0.1 μF	"	Polypropyrene
C8	QCF31HP-103	0.01 μF	"	Ceramic
C9	QET41EM-336	33 μF	25 V	Electrolytic
C10	QET41HM-105	1 μF	50 V	"
C11	QCT25UJ-330	33 pF	"	Ceramic
C12	QET41VM-106	10 μF	35 V	Electrolytic
C13	QCF31HP-103	0.01 μF	50 V	Ceramic
C14	QCY31HK-102	1000 pF	"	"
C15	QCF31HP-103	0.01 μF	"	"
C16	QET41VM-106	10 μF	35 V	Electrolytic
C17	QCF31HP-103	0.01 μF	50 V	Ceramic
C18	QCF31HP-103	"	"	"
C19	QCF31HP-223	0.022 μF	"	"
C20	QCF31HP-223	"	"	"

Resistors

Item No.	Part Number	Rating		Description
R1	QRX019J-2R7	2.7 Ω	1 W	Metal Film ⚠
R2	QRD167J-181	180 Ω	1/6 W	Carbon
R3	QRD167J-101	100 Ω	"	"
R4	QRD167J-332	3.3 kΩ	"	"
R5	QRD167J-821	820 Ω	"	"
R6	QRD141J-102	1 kΩ	1/4 W	"
R7	QRD167J-471	470 Ω	1/6 W	"
R8	QRD167J-102	1 kΩ	"	"
R9	QRD167J-203	10 kΩ	"	"
R10	QRD167J-163	16 kΩ	"	"
R11	QRD167J-474	470 kΩ	"	"
R12	QRD167J-104	100 kΩ	"	"
R13	QRD167J-913	91 kΩ	"	" (75 kΩ ~ 100 kΩ)
R14	QRD167J-104	100 kΩ	"	"
R15	QRV146F-2702	27 kΩ	1/4 W	Metal Film ⚠
R16	QRD167J-474	470 kΩ	1/6 W	Carbon
R17	QRD167J-101	100 Ω	"	"
R18	QRD167J-102	1 kΩ	"	"
R19	QRD167J-104	100 kΩ	"	"
R20	QRD167J-105	1 MΩ	"	"
R21	QRD167J-101	100 Ω	1/6 W	"
R22	QRD167J-183	18 kΩ	"	"
R23	QRD141J-101	100 Ω	1/4 W	"
R24	QRD121J-271	270 Ω	1/2 W	"
R25	QRD167J-153	15 kΩ	1/6 W	"

Others

Item No.	Part Number	Rating	Description
CN1	QMV5004-004		5 Pin Connector
X1	ESRE006		X'tal
HG1	VHE-101		Hall Generator
HG2	VHE-101		"

13. Power Cord Connections in Different Areas

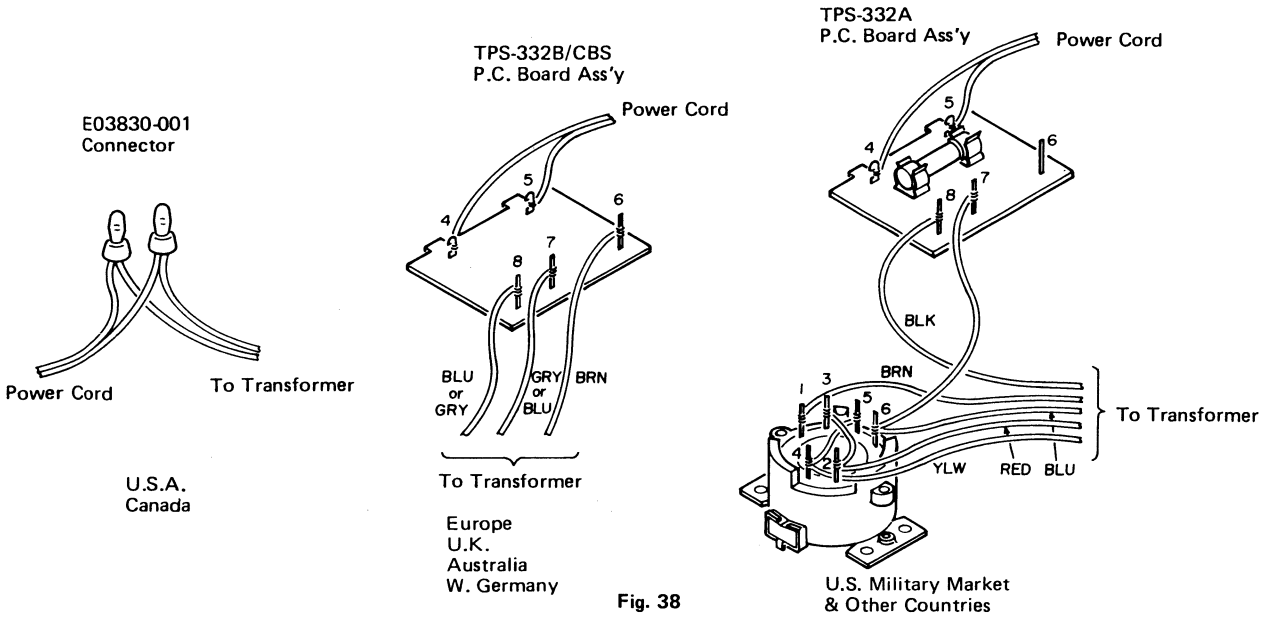


Fig. 38

13-(1) How to handle the solderless connector

In this turntable, a solderless connector is used to connect the power cord with the primary lead wire of the power transformer.
When it is unavoidable to replace this connector for replacement of the power transformer, or the like, positively perform the replacement in accordance with the following procedure to avoid dangers.

- **Connector part number**
  E03830-001
- **Tools**
  Tool for installing solderless connectors.
  Do not use those (small cutting pliers, etc.) other than regular tools.
  Example: VACO No. 1963 (Courtesy Vaco Products Co.)

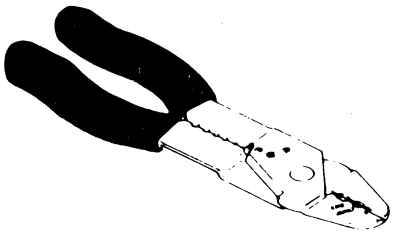


Fig. 39

- **Replacement**

1. Cut both the power cord and the primary lead wire at near the edge of the connector to be replaced.
   Note: Do not re-use the used connector.

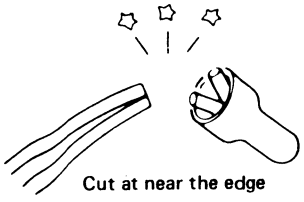


Fig. 40

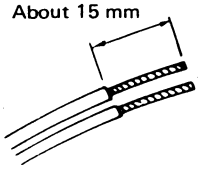


Fig. 41

2. Peel off the coverings so that the respective conductor tops appear by about 15 mm as shown in the Fig. 41.
   Note: In the case of stranded wires, test each wire.
3. Adjust the tips of the power cord and the primary lead wire with each other, then securely insert them into the connector as shown in the Fig. 42.

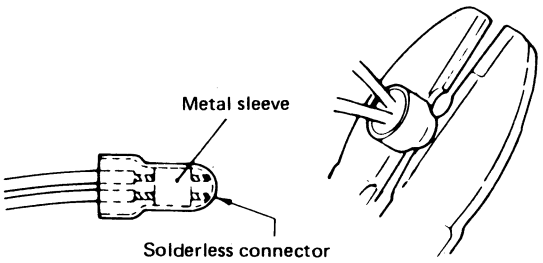


Fig. 42

Fig. 43

4. Secure the nearly equal central part of the metal sleeve with the second concave of the tool for solderless securing as shown in the Fig. 43.
   Note: Perform a complete securing.
5. After solderless securing, check the following as shown in the Fig. 44.
   Note: Protect connector with isolation tape or vinyl tube for safety. Furthermore, clamp it for out of touch with metal part.

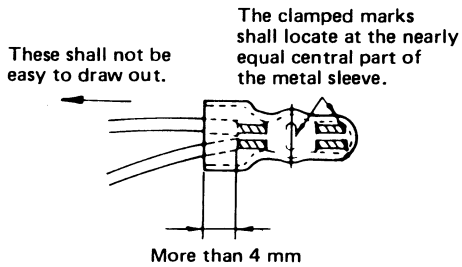

These shall not be easy to draw out.
The clamped marks shall locate at the nearly equal central part of the metal sleeve.
More than 4 mm

Fig. 44

14. Packing Materials and Part Numbers

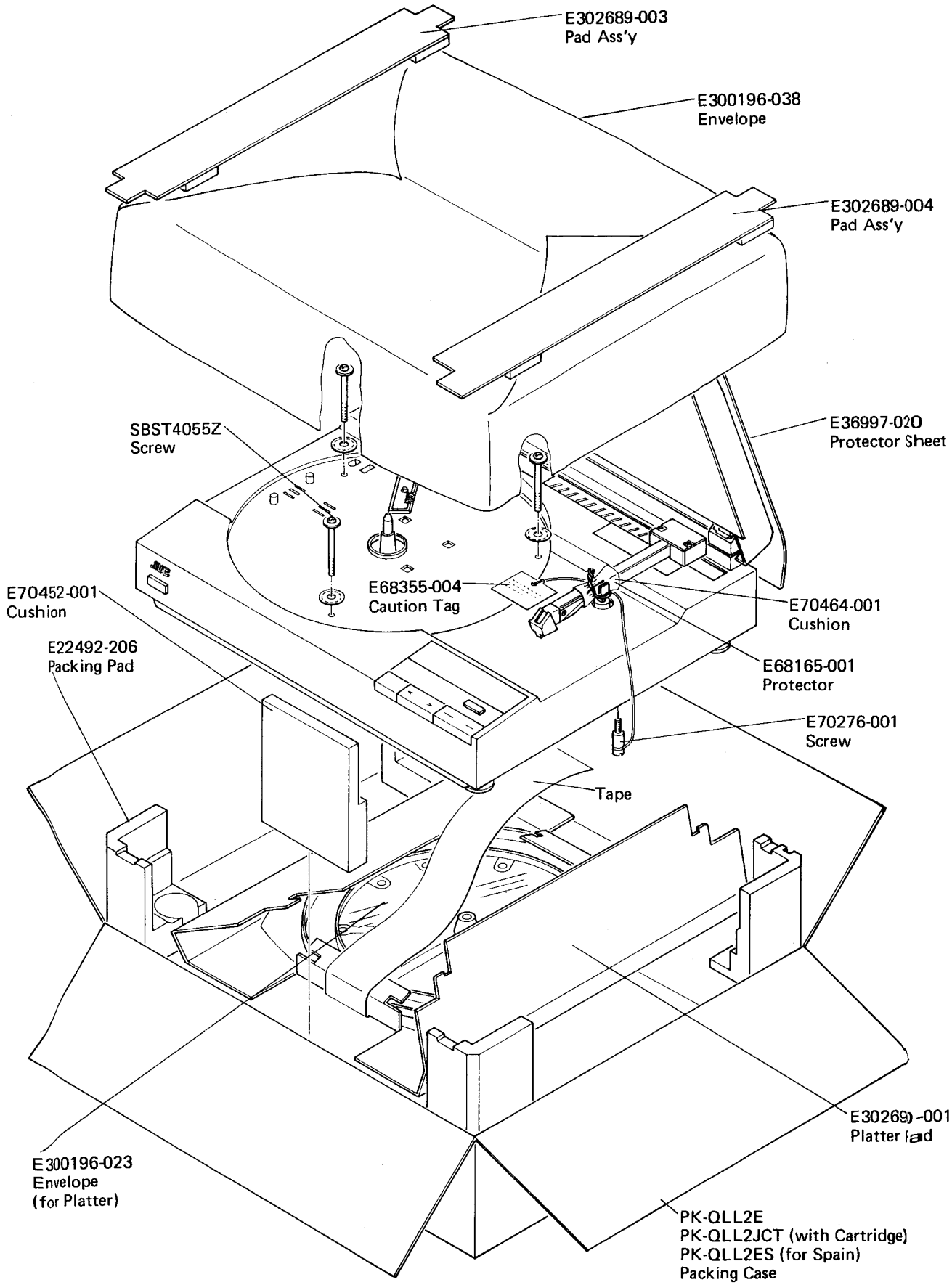
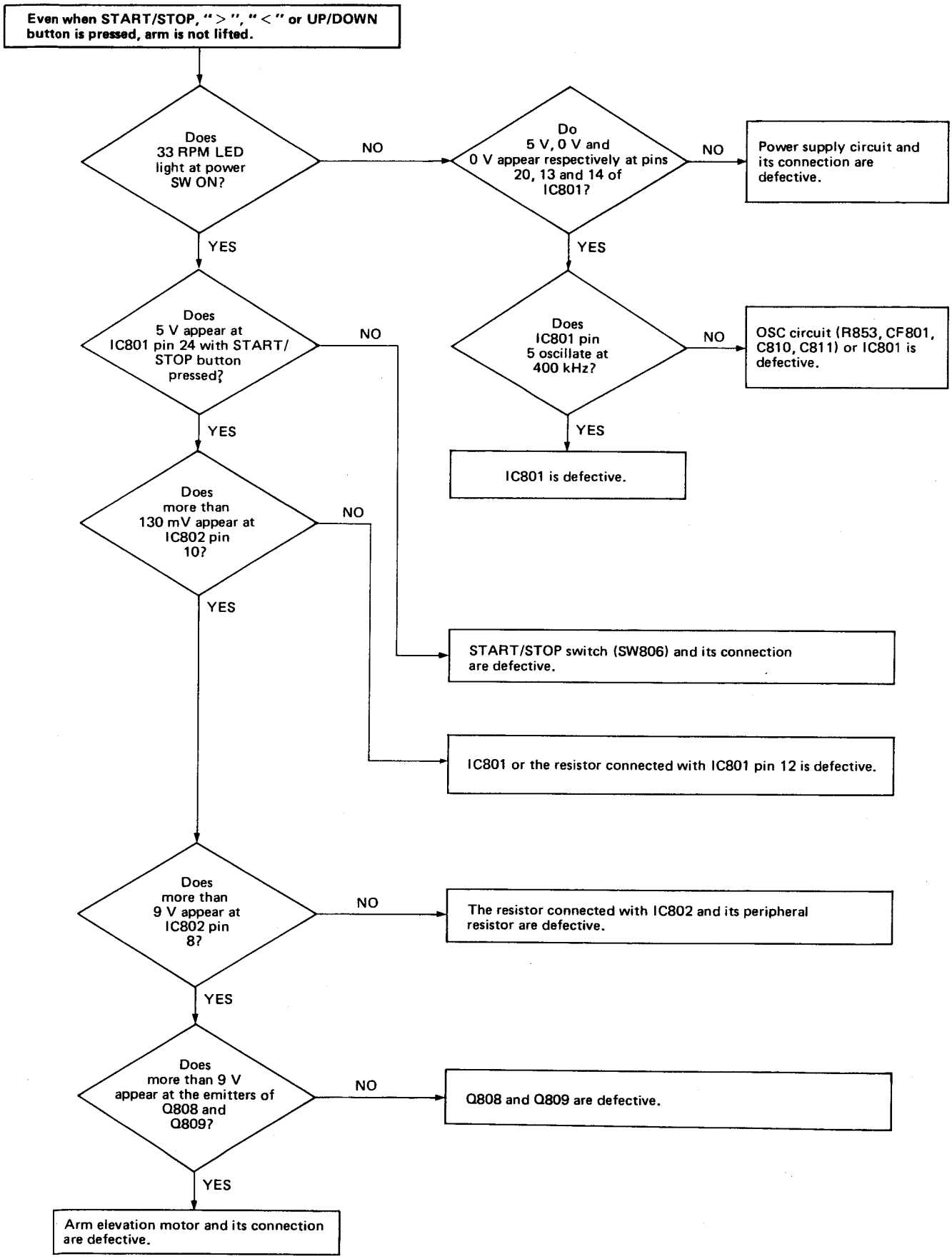
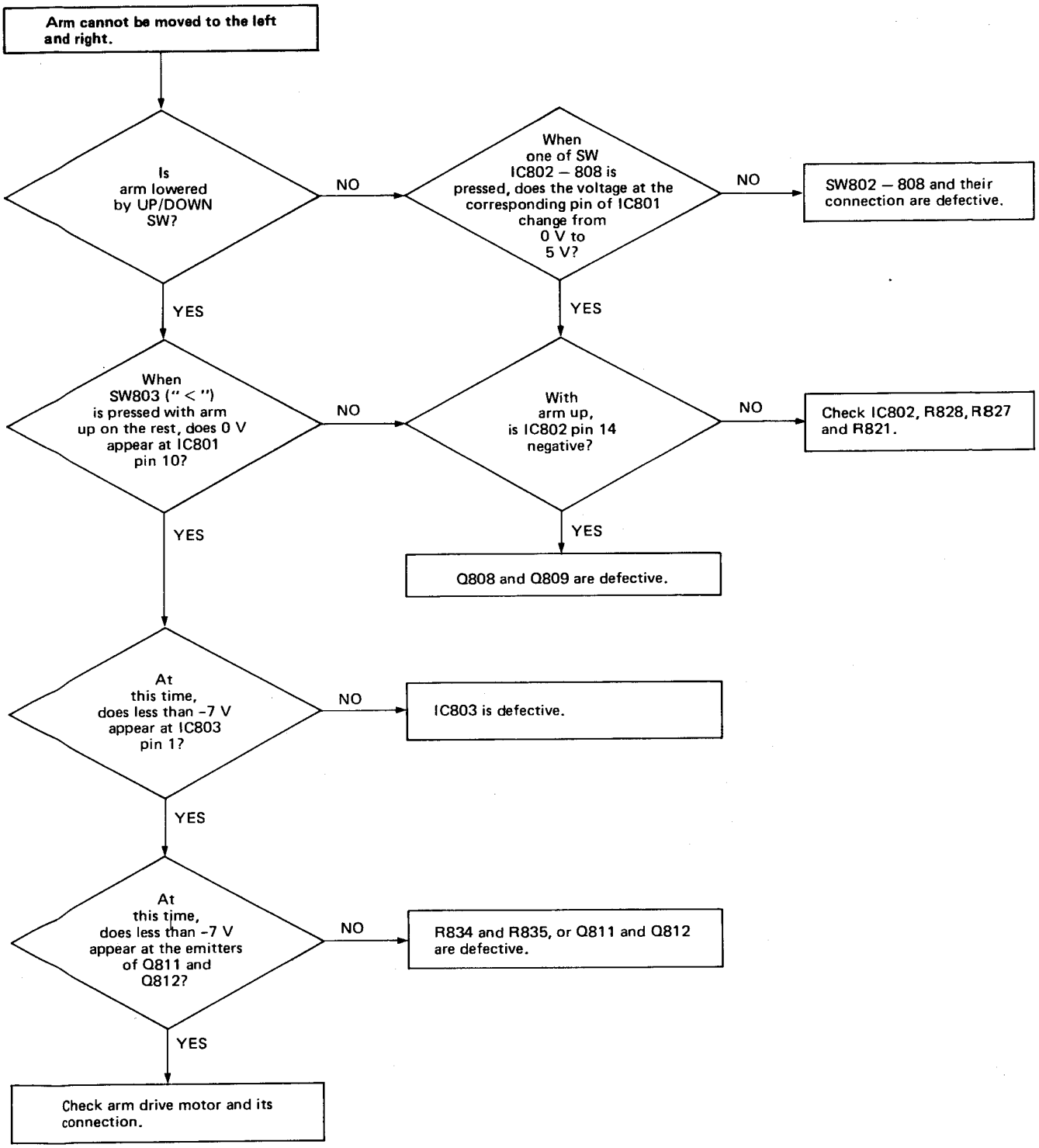


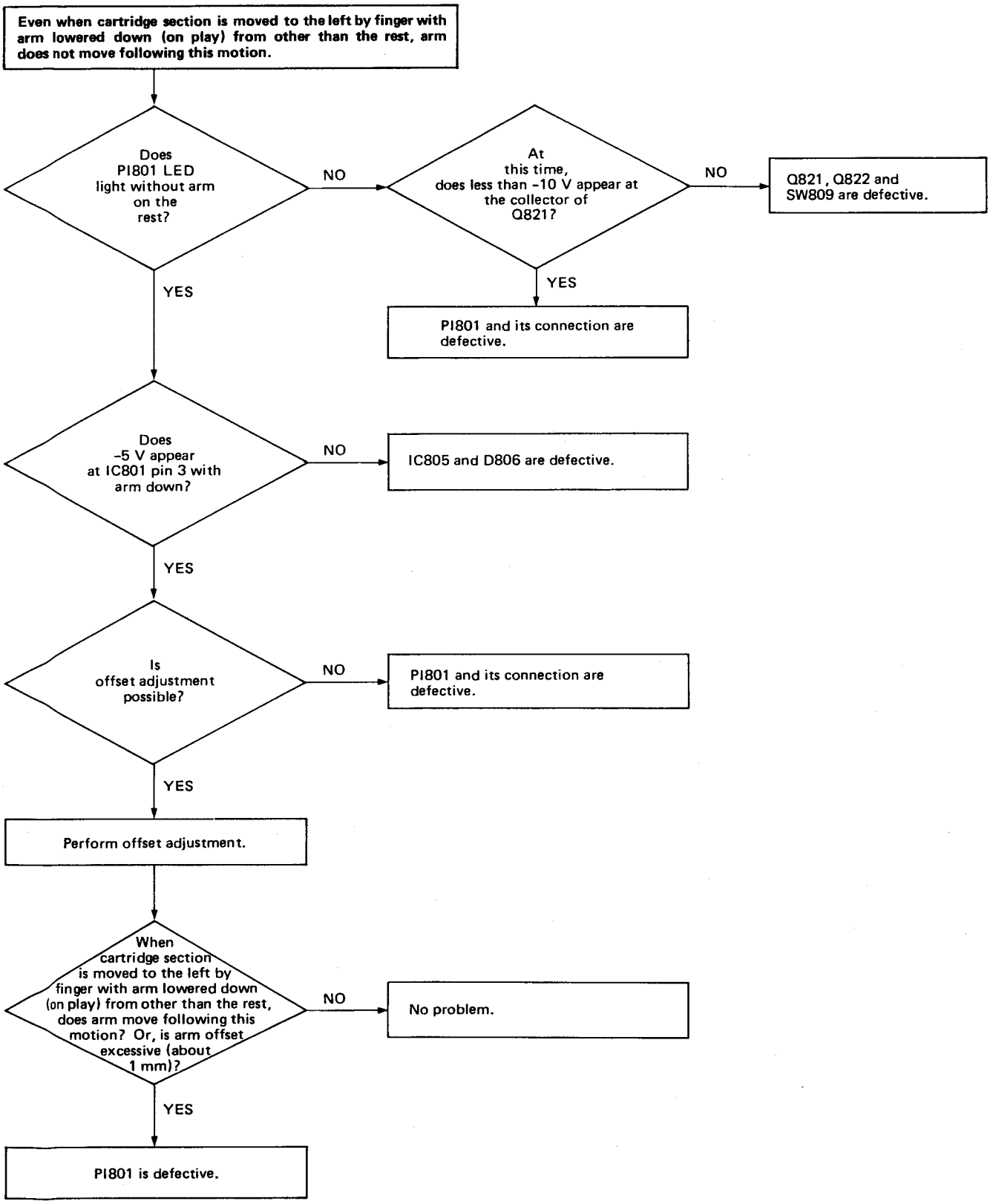
Fig. 45

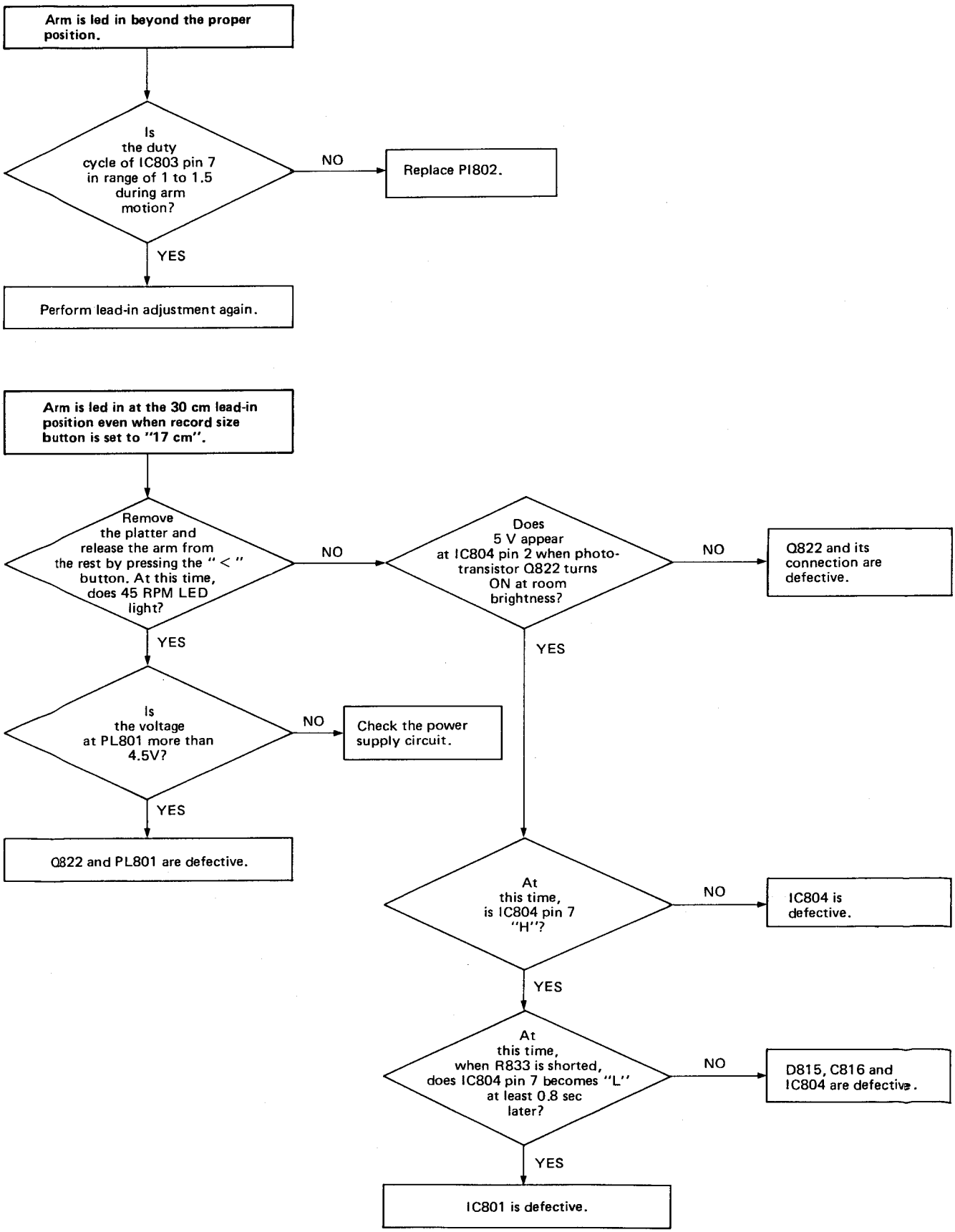
QL-L2
No. 2659

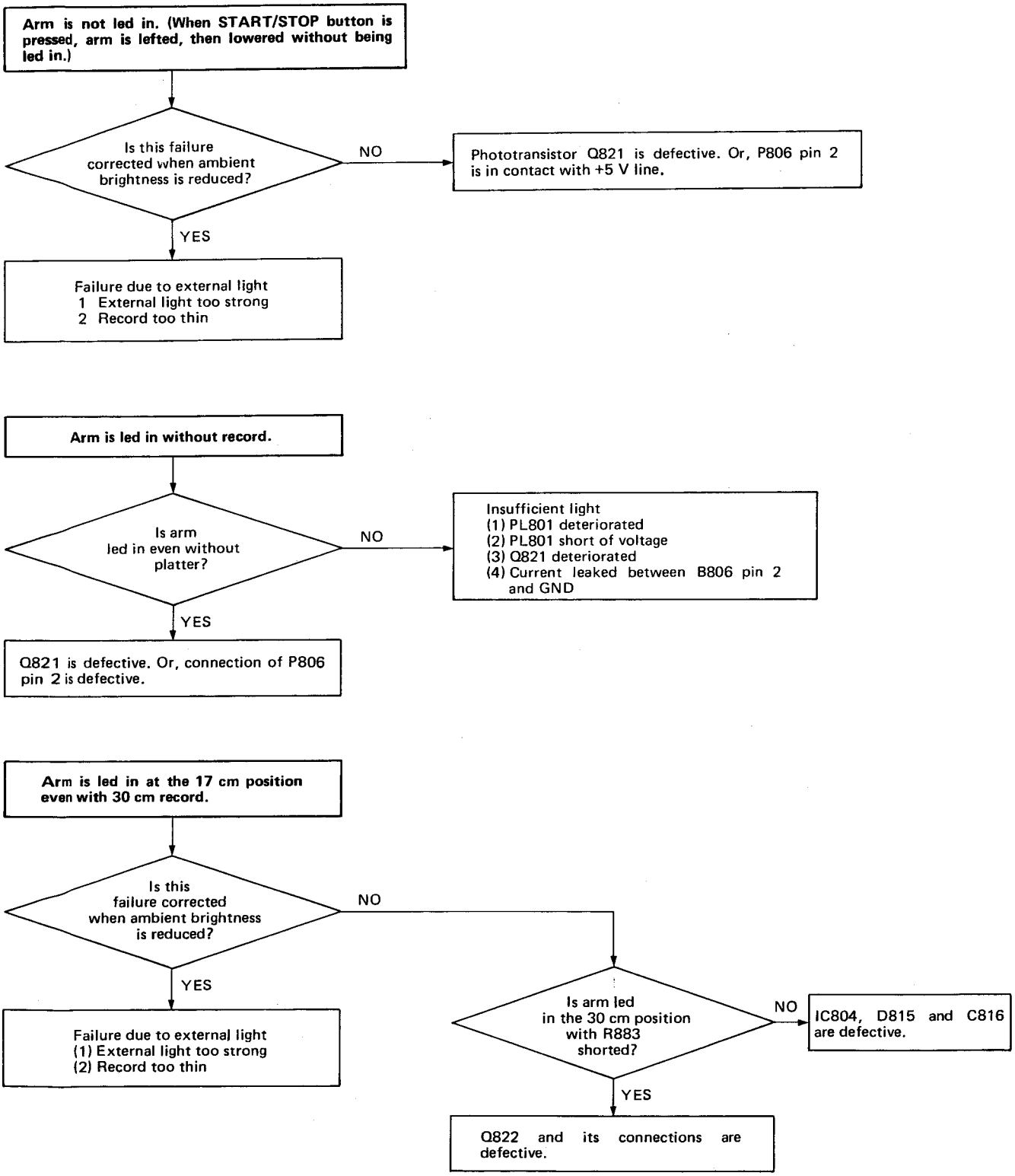
15. Troubleshooting

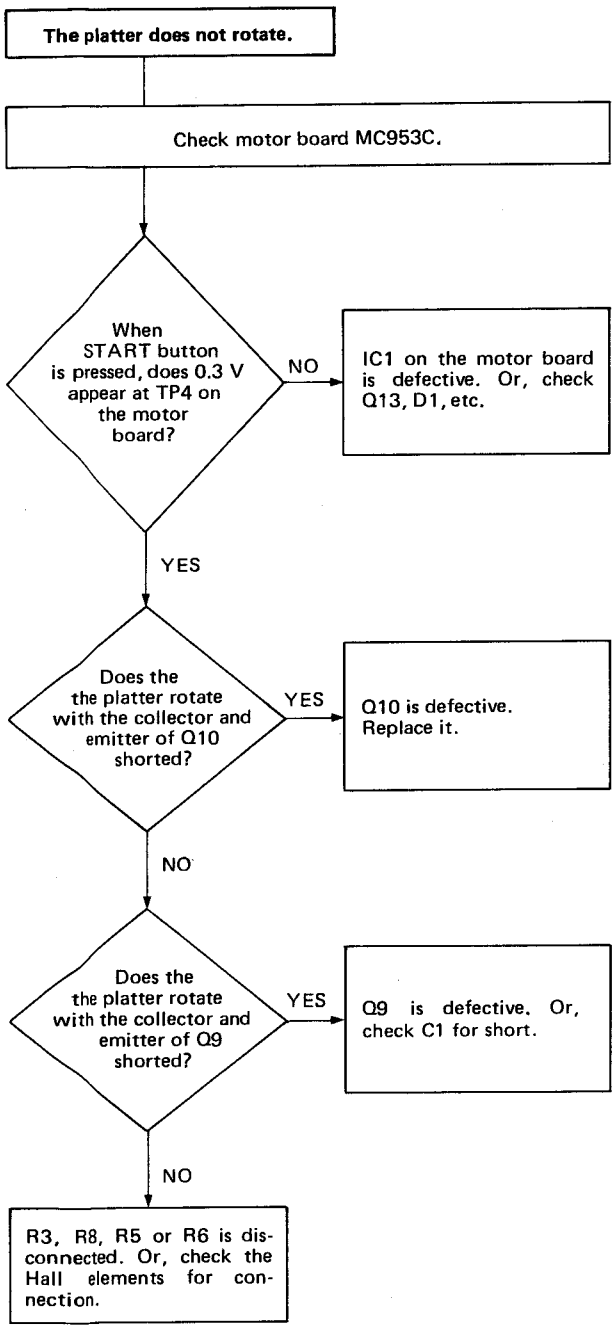

Even when START/STOP, " > ", " < " or UP/DOWN button is pressed, arm is not lifted.
Does 33 RPM LED light at power SW ON?
NO
Do 5 V, 0 V and 0 V appear respectively at pins 20, 13 and 14 of IC801?
NO
Power supply circuit and its connection are defective.
YES
YES
Does 5 V appear at IC801 pin 24 with START/STOP button pressed?
NO
Does IC801 pin 5 oscillate at 400 kHz?
NO
OSC circuit (R853, CF801, C810, C811) or IC801 is defective.
YES
YES
IC801 is defective.
Does more than 130 mV appear at IC802 pin 10?
NO
YES
START/STOP switch (SW806) and its connection are defective.
IC801 or the resistor connected with IC801 pin 12 is defective.
Does more than 9 V appear at IC802 pin 8?
NO
The resistor connected with IC802 and its peripheral resistor are defective.
YES
Does more than 9 V appear at the emitters of Q808 and Q809?
NO
Q808 and Q809 are defective.
YES
Arm elevation motor and its connection are defective.

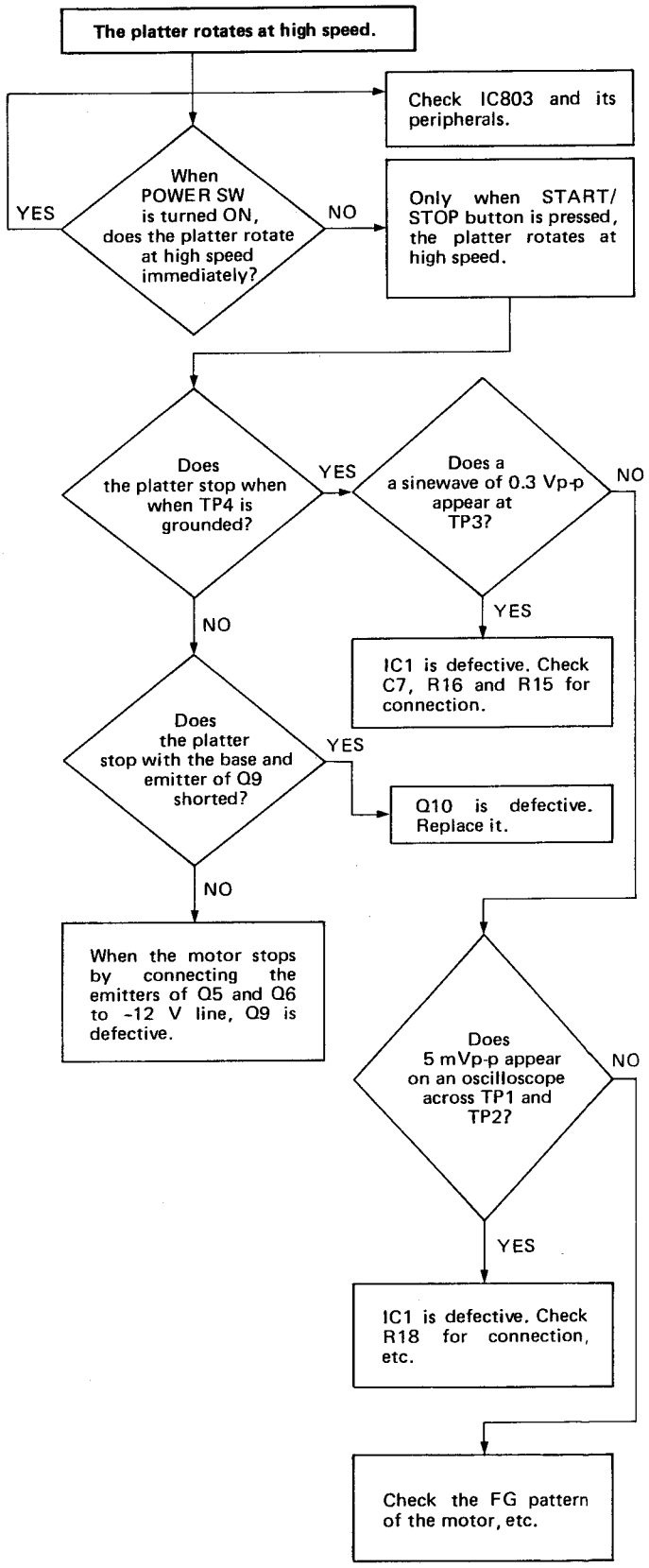

Arm cannot be moved to the left and right.
Is arm lowered by UP/DOWN SW?
NO
When one of SW IC802 – 808 is pressed, does the voltage at the corresponding pin of IC801 change from 0 V to 5 V?
NO
SW802 – 808 and their connection are defective.
YES
YES
When SW803 (" < ") is pressed with arm up on the rest, does 0 V appear at IC801 pin 10?
NO
With arm up, is IC802 pin 14 negative?
NO
Check IC802, R828, R827 and R821.
YES
YES
Q808 and Q809 are defective.
At this time, does less than -7 V appear at IC803 pin 1?
NO
IC803 is defective.
YES
At this time, does less than -7 V appear at the emitters of Q811 and Q812?
NO
R834 and R835, or Q811 and Q812 are defective.
YES
Check arm drive motor and its connection.


Even when cartridge section is moved to the left by finger with arm lowered down (on play) from other than the rest, arm does not move following this motion.
Does PI801 LED light without arm on the rest?
NO
At this time, does less than -10 V appear at the collector of Q821?
NO
Q821, Q822 and SW809 are defective.
YES
YES
PI801 and its connection are defective.
Does -5 V appear at IC801 pin 3 with arm down?
NO
IC805 and D806 are defective.
YES
Is offset adjustment possible?
NO
PI801 and its connection are defective.
YES
Perform offset adjustment.
When cartridge section is moved to the left by finger with arm lowered down (on play) from other than the rest, does arm move following this motion? Or, is arm offset excessive (about 1 mm)?
NO
No problem.
YES
PI801 is defective.


Arm is led in beyond the proper position.
Is the duty cycle of IC803 pin 7 in range of 1 to 1.5 during arm motion?
NO
Replace PI802.
YES
Perform lead-in adjustment again.
Arm is led in at the 30 cm lead-in position even when record size button is set to "17 cm".
Remove the platter and release the arm from the rest by pressing the " < " button. At this time, does 45 RPM LED light?
NO
Does 5 V appear at IC804 pin 2 when photo-transistor Q822 turns ON at room brightness?
NO
Q822 and its connection are defective.
YES
YES
Is the voltage at PL801 more than 4.5V?
NO
Check the power supply circuit.
YES
Q822 and PL801 are defective.
At this time, is IC804 pin 7 "H"?
NO
IC804 is defective.
YES
At this time, when R833 is shorted, does IC804 pin 7 becomes "L" at least 0.8 sec later?
NO
D815, C816 and IC804 are defective.
YES
IC801 is defective.


Arm is not led in. (When START/STOP button is pressed, arm is lefted, then lowered without being led in.)
Is this failure corrected when ambient brightness is reduced?
NO
Phototransistor Q821 is defective. Or, P806 pin 2 is in contact with +5 V line.
YES
Failure due to external light
1 External light too strong
2 Record too thin
Arm is led in without record.
Is arm led in even without platter?
NO
Insufficient light
(1) PL801 deteriorated
(2) PL801 short of voltage
(3) Q821 deteriorated
(4) Current leaked between B806 pin 2 and GND
YES
Q821 is defective. Or, connection of P806 pin 2 is defective.
Arm is led in at the 17 cm position even with 30 cm record.
Is this failure corrected when ambient brightness is reduced?
NO
YES
Failure due to external light
(1) External light too strong
(2) Record too thin
Is arm led in the 30 cm position with R883 shorted?
NO
IC804, D815 and C816 are defective.
YES
Q822 and its connections are defective.


The platter does not rotate.
Check motor board MC953C.
When START button is pressed, does 0.3 V appear at TP4 on the motor board?
NO
IC1 on the motor board is defective. Or, check Q13, D1, etc.
YES
Does the the platter rotate with the collector and emitter of Q10 shorted?
YES
Q10 is defective. Replace it.
NO
Does the the platter rotate with the collector and emitter of Q9 shorted?
YES
Q9 is defective. Or, check C1 for short.
NO
R3, R8, R5 or R6 is disconnected. Or, check the Hall elements for connection.


The platter rotates at high speed.
Check IC803 and its peripherals.
When POWER SW is turned ON, does the platter rotate at high speed immediately?
YES
NO
Only when START/STOP button is pressed, the platter rotates at high speed.
Does the platter stop when when TP4 is grounded?
YES
Does a a sinewave of 0.3 Vp-p appear at TP3?
NO
YES
IC1 is defective. Check C7, R16 and R15 for connection.
NO
Does the platter stop with the base and emitter of Q9 shorted?
YES
Q10 is defective. Replace it.
NO
When the motor stops by connecting the emitters of Q5 and Q6 to -12 V line, Q9 is defective.
Does 5 mVp-p appear on an oscilloscope across TP1 and TP2?
NO
YES
IC1 is defective. Check R18 for connection, etc.
Check the FG pattern of the motor, etc.

16. Parts List with Specified Numbers for Designated Areas

Item No.	Description	U.S.A. & (Canada)	U.S. Military Market & Other Countries	Europe & West Germany	Australia	U.K.
1	Power Transformer ⚠	ETP1010-14JA	ETP1010-14GA	ETP1010-14EA	ETP1010-14EA	ETP1010-14EABS
2	Power Cord ⚠	QMP1200-200	QMP7600-250	QMP3900-200	QMP2500-244	QMP9017-008BS
3	Cord Stopper ⚠	QHS3876-162	QHS3876-162	QHS3876-162	QHS3876-162	QHS3876-162BS
4	Connector ⚠	E03830-001	–	–	–	–
5	Fuse (Primary) ⚠	–	QMF51A2-R50L	–	–	–
6	Fuse (Secondary) ⚠	QMF61U1-R80	QMF51A2-R80L	QMF51A2-R80L	QMF51A2-R80L	QMF51A2-R80LBS
7	Voltage Selector ⚠	–	QSR0085-008U	–	–	–
8	Main P.C. Board Ass'y	ENL-002A	ENL-002B	ENL-002B	ENL-002B	ENL-002B
9	Fuse P.C. Board Ass'y	–	TPS-332A	TPS-332B	TPS-332B	TPS-332CBS
10	P.C. Board Case	–	E302244-003	E302244-003	E302244-003	E302244-003
11	P.C. Board Cover	–	E302246-001	E302246-001	E302246-001	E302246-001
12	Tonearm Ass'y	E24400-001 (")	E24400-001	E24400-001	E2400-001	E24400-001
13	Cartridge	– (MD1045Z)	MD1045Z	MD1045Z	MD1045Z	MD1045Z
14	Stylus Cover	– (E70328-001)	E70328-001	E70328-001	E70328-001	E70328-001
15	Voltage Selector Cover	–	E302764-001	–	–	–
16	Signal Cord	EWP202-007 (EWP202-008)	EWP202-008	EWP202-008	EWP202-008	EWP202-008

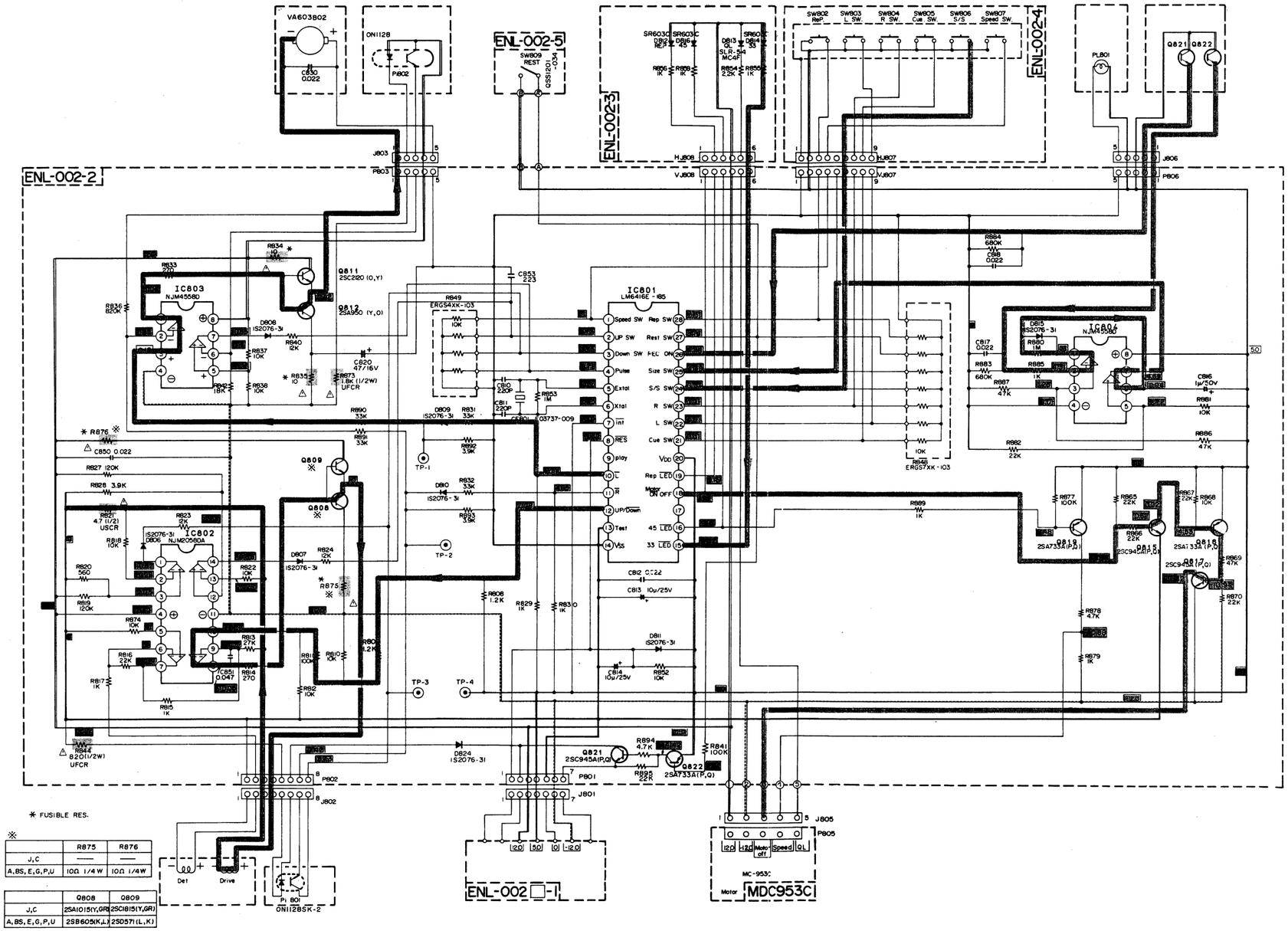
⚠ : Safety Parts

17. Accessories List

Item No.	Description	U.S.A. & (Canada)	U.S. Military Market & (Other Countries)	Europe & (Australia)	West Germany	U.K.
1	Instruction Book	E30580-1111A (")	E30580-1111A (")	E30580-1111A (")	E30580-1111A	E30580-1111ABS
2	Warranty Card	BT20047A (BT20025F)	BT20047A (–)	– (BT20029C)	BT20064	BT20060
3	Service Information Card	BT20046B (–)	BT20046B (–)	–	–	–
4	EP Adaptor	E66329-002 (")	E66329-002 (")	E66329-002 (")	E66329-002	E66329-002
5	Siemens Plug	–	– (E04056)	–	–	–
6	Safety Instruction	BT20044D (–)	–	–	–	–
7	Envelope (for Instruction Book)	E300196-010 (")	E300196-010 (")	E300196-010 (")	E300196-010	E300196-010
8	Envelope (for Warranty Card)	E66416-003 (–)	–	–	–	–
9	Screwdriver	E302584-001 (–)	–	–	–	–
10	Envelope (for Screwdriver)	QPGA007-00605 (–)	–	–	–	–
11	EEC Agency	–	–	–	BT20066	BT20066
12	Cartridge Mounting Screw	E70254-001 (–)	–	–	–	–

18. QL-L2 Schematic Diagram

18-(1) Control section



* FUSIBLE RES.

※

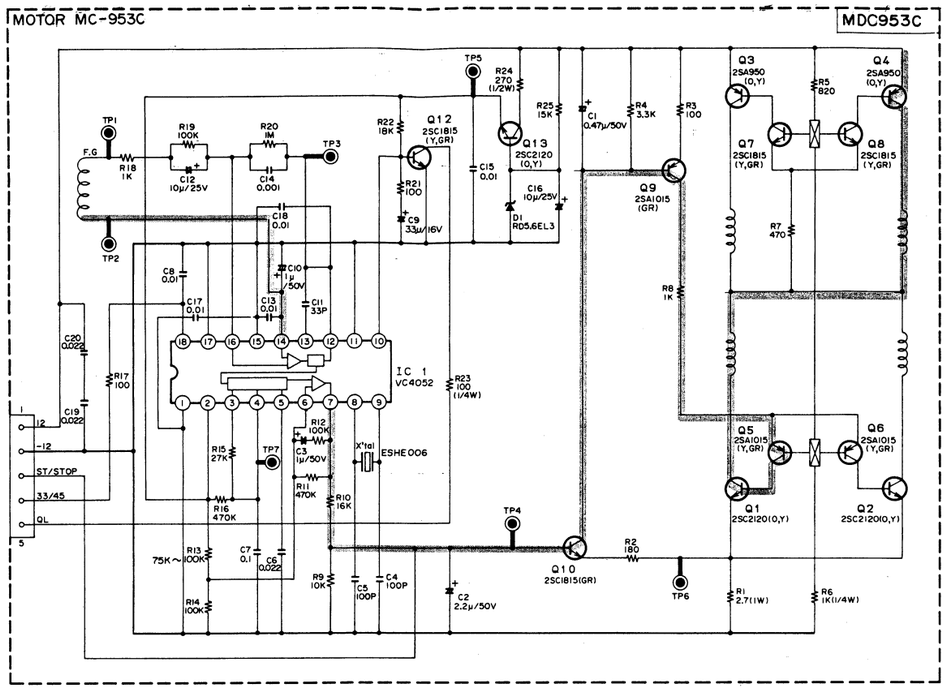
	R875	R876
J,C	——	——
A,BS,E,G,P,U	10Ω 1/4W	10Ω 1/4W

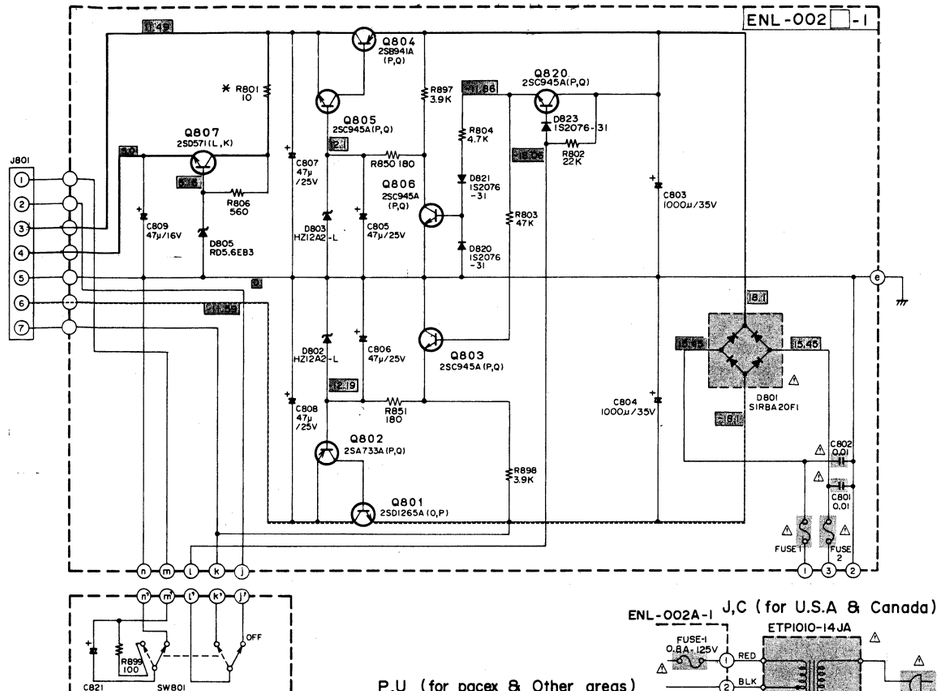
	Q808	Q809
J,C	2SA1015(Y,GR)	2SC1815(Y,GR)
A,BS,E,G,P,U	2SB605(K,L)	2SD571(L,K)

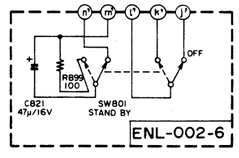
Notes:

1. —— indicates positive B power supply.
2. ----- indicates negative B power supply.
3. ■■■ indicates signal path.
4. Voltage values measured with a tester (impedance 20 kΩ/V) in mode of "33-1/3 r.p.m." are indicated as below.
   Example: ■■■ (unit: V)
5. When replacing the parts in the darkened area (■■■) and those marked with △, be sure to use the designated parts to ensure safety.
6. This is the standard circuit diagram.
   The design and contents are subject to change without notice.

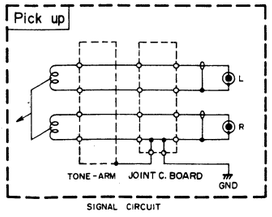
18-(2) Drive moter and power supply section



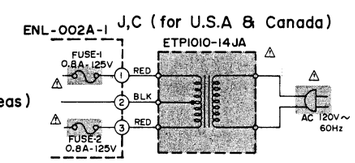




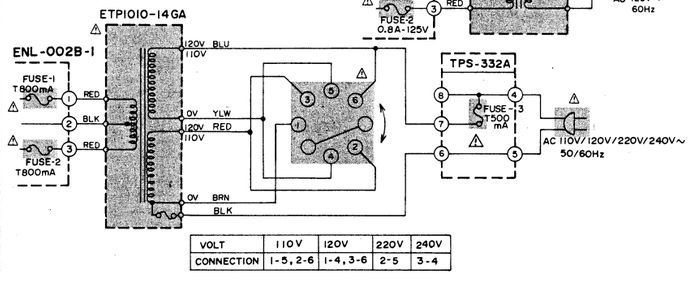
ENL-002-6



ENL-002A-1 J,C (for U.S.A & Canada)

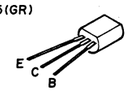


P,U (for pacex & Other areas)

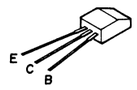


VOLT	110V	120V	220V	240V
CONNECTION	1-5, 2-6	1-4, 3-6	2-5	3-4

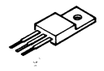
2SA733A(P,Q) 2SA950 (O,Y)
2SA1015(Y,GR) 2SC945A (P,Q)
2SC1815(Y,GR) 2SC2120(O,Y)
2SC1815(GR)



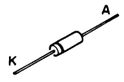
2SD571 (L,K)



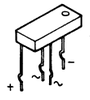
2SB941A (Q,P)
2SD1265A(O,P)



RD5.6EB3 HZ12A2-L
RD5.6EL3 1S2076-31



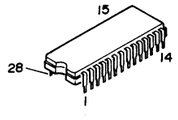
S1RBA20F1



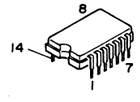
SR603C

SLR54MC4F

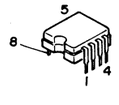
LM6416E-185



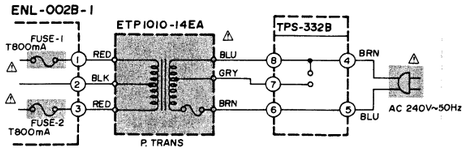
NJM2058DA



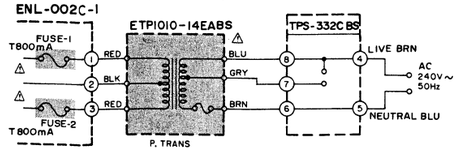
NJM4558D



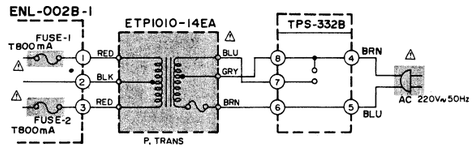
A (for Australia)



BS (for U.K.)



E,G (for Europe & Germany)



Notes:

1. ——— indicates positive B power supply.
2. ----- indicates negative B power supply.
3. ▒▒ indicates signal path.
4. Voltage values measured with a tester (impedance 20 kΩ/V) in mode of "33-1/3 r.p.m." are indicated as below.
   Example: 12.0 (unit: V)
5. When replacing the parts in the darkened area (▒▒) and those marked with ⚠, be sure to use the designated parts to ensure safety.
6. This is the standard circuit diagram.
   The design and contents are subject to change without notice.